UNIVERSITY OF KWAZULU-NATAL

INFORMATION AND COMMUNICATION TECHNOLOGIES AND SUSTAINABLE LIVELIHOODS: A CASE OF SELECTED RURAL AREAS OF TANZANIA

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Submitted: December 2008

DECLARATION

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ABSTRACT

Information and communication technologies (ICTs) have, in the recent past, attracted enormous attention as important tools for socio-economic development. However, the role of ICTs in fostering development and addressing the needs of the poor, especially in developing countries, has become the subject of a heated debate. This contestation is due to the high failure rate of the ICTs for development projects and a widening gap between the expectations of what ICTs can possibly do and the experiential reality of how these technologies are actually being used. More often than not ICTs have been regarded as a panacea or a 'magic bullet' that will solve all development problems, with ill-conceived expectations of how they would be used.

This study examined the relationship between ICTs and sustainable livelihoods in selected rural areas of Tanzania. The aim was to investigate how and for what purposes ICTs are used by people in the selected rural areas of Tanzania and to study the effect that ICTs have had on the various aspects of their livelihoods. A combination of the sustainable livelihoods framework and other ICTs for development models formed the theoretical foundation of the study. The investigation was carried out using ICT services provided by the telecentres and mobile phone services.

The study was conducted in four rural districts in Tanzania which have telecentres. It used a multi-case study research design. A mixed paradigm methodology was adopted and the qualitative research was used as a dominant paradigm. Data was collected through structured interview protocols administered to 203 users and non-users of ICTs in communities surrounding the telecentres. Semi-structured interview protocols were administered to four managers of the telecentres. In addition, eight focus group discussions were conducted in communities surrounding the telecentres. An observation checklist was used to verify data obtained from managers, users and non-users of the telecentres. The study administered semi-structured interview protocols to officers from the ministry responsible for ICTs in Tanzania, that is the Ministry of Infrastructure Development (MoID), The Tanzania Communication and Regulatory Authority (TCRA) and a national research institution (The Commission for Science and Technology- COSTECH).

The findings of the study indicated that, contrary to the use of mobile phones, which was characterised by greater uniformity across socio-economic groups and gender, telecentre users in the researched areas were generally young. The majority were males with higher levels of education. It was found that telecentres management have failed to take into consideration the appalling conditions of the extremely poor and disadvantaged individuals in their provision of ICT services to the community.

The study established that the urban rural digital divide still exists and is still a reality in the areas reviewed, despite some efforts that are under way to bring ICTs to those communities. Old ICTs such as radio and television are not universally available. It was observed that inadequate road infrastructure makes it difficult for farmers to transport their produce to markets outside the districts, even in cases where farmers are provided with information on the availability of those markets. Inadequate electricity supply hinders large-scale uptake of ICTs in rural areas. The findings show that telecentres managers were not aware of the information needs of the communities they serve and therefore they were not in a position to meet such information needs.

Due to personnel's inadequate skills and capacity the Ministry of Infrastructure Development did not play its policy-making function effectively. This problem, coupled with delayed implementation of important policy objectives such as the universal access policy and even the national ICT policy itself, affects the development of the ICT sector in rural areas of Tanzania. The findings further show that while the necessary conditions for access exist in all the telecentres involved in the study, sufficient conditions for access are still lacking, especially with regard to skills, awareness and affordability.

On the relationship between ICT and rural livelihoods the findings of the study show that while ICTs may not fully support and sustain socio-economic development in poor communities, the impact of these technologies extends to various aspects of the livelihoods of the rural people. Economically, these technologies lead to better earnings and savings. Socially, they help in community interaction and knowledge-sharing, better follow-up for remittances and creation of savings and credit co-operative societies. In relation to human capital, the technologies'

implications extend to ICT literacy, improved farming techniques and better access to information on new cash crops. The use of ICTs in rural areas is still faced with many barriers. These range from affordability to language problems and the lack of basic infrastructure such as electricity. Language was particularly found to be a substantial barrier to effective use and application of ICTs.

The study recommends that telecentre managers should re-design programmes with the aim of bringing the under-represented groups such as farmers back to the centre of their projects, rather than treating them as passive receivers of ICT services. On the issue of mobile phones, there is a need to develop services that are nuanced towards the real needs of the rural people and incorporate them into the mobile technology. The study recommends that universal access policies should involve old ICTs such as radio and television, or people in the rural areas, who have fewer resources, will eventually pay too much for basic communication services, as in the case of satellite television and radio. Capacity-building is important, not only in the regulatory authorities, but also in the ministries responsible for ICTs and other institutions involved with ICTs, so as to provide effective national ICT leadership.

The study recommends that managers of telecentres learn about the different aspects of access, in order for them to go beyond the provision of physical access to ICTs. Continuous improvement and renewal of telecentre services is necessary to ensure survival of the telecentres. Collaboration of the telecentres and other organisations, such as academic institutions, is needed to create content both for the telecentres and the community radios. Telecentres and other information systems developed or adopted to serve the people must meet the needs of the people intended to be served. This can be done by regularly conducting information needs assessment.

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DEDICATION

I dedicate this work to my husband, Joshua Stephen Muoki, and my son, Denis Mumo Muoki.

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LIST OF ABBREVIATIONS AND ACRONYMS

AISI	-	African Information Society Initiative
AM	-	Ante Meridiam - before mid-day
ASK	-	Anomalous State of Knowledge
CAI	-	Computer Aid International
CAQDAS	-	Computer Assisted Qualitative Data Analysis
CBO	-	Community Based Organisation
CD-ROM	-	Compact Disk Read Only Memory
CINSA	-	Community Information Network for Southern Africa
CIT	-	Critical Incident Technique
COSTECH	-	Tanzanian Commission for Science and Technology
CROMABU	-	Crop and Marketing Bureau
CTA	-	Technical Centre for Agricultural and rural Co-operation
DC	-	District Commissioner
DOT Force	-	Digital Opportunity Task Force
Email	-	Electronic mail
FADECO	-	Family Alliance for Development Co-operation
FM	-	Frequency Modulated
GICT	-	Global Information and Communication Technology
GKP	-	Global Knowledge Partnership
GMPCS	-	Global Mobile Personal Communication Service
GSM	-	Global System for Mobile communications
HIPC	-	Highly Indebted Poor Countries Initiative
HTML	-	Hypertext Markup Language
ICT	-	Information and Communication Technologies
IDRC	-	International Development Research Centre
IFAD	-	International Fund for Agricultural Development
IFIs	-	International Financial Institutions
IICD	-	International Institute for Communication and Development
ILFS	-	Integrated Labour Force Survey
ILO	-	International Labour Organisation
IMF	-	International Monetary Fund
ISP	-	Internet Service Provider
IT	-	Information Technology
ITU	-	International Telecommunication Union
KACE	-	Kenya Agricultural Commodity Exchange Limited
KADEVO	-	Karagwe Development Volunteer Organisations
KAMEA	-	Karagwe Media Association
LAN	-	Local Area Networks
LCD	-	Liquid Crystal Display
LDC	-	Least Developed Countries
LZARDI	-	Lake Zone Agriculture Research Development Institute
MCT	-	Multipurpose Community Telecentres

MDG	-	Millennium Development Goals
MIS	-	Market Information Service
MIT	-	Ministry of Information and Technology
MoID	-	Ministry of Infrastructure Development
MS-DOS	-	Microsoft Disk Operating System
MTN	-	Mobile Telecom Network
NGO	-	Non-Governmental Organisation
NSGRP	-	National Strategy for Growth and Reduction of Poverty
OEDC	-	Organisation for Economic Co-operation and Development
OKN	-	Open Knowledge Network
PM	-	Post Meridian - after mid day
PRSP	-	Poverty Reduction Strategy Paper
PTO	-	Public Telecom Operator
RAIN	-	Agricultural Information Network
RTD	-	Radio Tanzania Dar es Salaam
SACCOS	-	Savings and Credit Co-operative Society
SCECSAL	-	Standing Conference of Eastern, Central and Southern African Library and Information Associations
SDC	-	Swiss Agency for Development and Co-operation
SIDA	-	Swedish International Development Co-operation Agency
SIM	-	Subscriber Identity Module
SME	-	Small and Medium Enterprises
SMS	-	Short Message Service
SPSS®.	-	SPSS Inc.
STD	-	Subscriber Trunk Dialing
TANESCO	-	Tanzania Electric Supply Company Limited
TBC	-	Tanzania Broadcasting Commission
TCC	-	Tanzania Communication Commission
TCCIA	-	The Tanzania Chamber for Commerce Industry and Agriculture
TCRA	-	Tanzania Communication Regulatory Authority
TPC	-	Tanzania Posts Corporation
TPTC	-	Tanzania Posts and Telecommunication Corporation
TTCL	-	Tanzania Telecommunication Company Limited
UCC	-	University Computer Centre
UCSAF	-	Universal Communications Service Access Fund
UK	-	United Kingdom
UNDP	-	United Nations Development Programme
UNESCO	-	United Nations Educational, Scientific and Cultural Organisation
UNFPA	-	United Nations Population Fund
UNHCR	-	United Nations High Commission for Refugees
URT	-	United Republic of Tanzania
USA	-	United States of America
USAID	-	United States Agency for International Development
VCR	-	Video Cassette Recorder
VETA	-	Tanzania Vocational Education Training Authority
VPPs	-	Village Pay Phones

VSAT	-	Very Small Aperture Terminals
WSIS	-	World Summit on Information Society
WWW	-	World Wide Web
ZANTEL	-	Zanzibar Telecom

CHAPTER ONE
BACKGROUND TO THE STUDY

1.0 Introduction

Globally, it is estimated that a fifth of the world's population lives in extreme poverty. Most of the world's poor are found in developing countries, particularly in the countries of Sub-Saharan Africa. Tanzania is among the least developed countries of the world with about 36 percent of its population living below the poverty datum line of one United States (US) dollar per day (UNDP 2005). The Tanzanian economy depends heavily on agriculture, which accounts for about half of the Gross Domestic Product (GDP), provides 85 percent of exports and employs 80 percent of the workforce (URT 2002a). Seventy percent of the Tanzanian population lives in rural areas where agriculture, in the form of smallholder producers, is the major economic activity (URT 2005b). In most rural areas the small-scale activities of other sectors such as livestock-keeping, business, handicrafts, arts and cultural activities are common. Mining and fishing are also undertaken. However, most of these economic activities are underdeveloped and poverty levels are still high in most rural areas of Tanzania (URT 2005c). It is estimated that 80 percent of the poor in Tanzania are in rural areas (URT 2005c).

The Tanzanian Government has taken various measures to address the problem of poverty and various policies have been enacted to this effect. Some of these measures include the Poverty Reduction Strategy Paper (PRSP) of 2001; Tanzania's Development Vision 2025 of 1998 and National Strategy for Growth and Reduction of Poverty (NSGRP) of 2005 (URT 1998; URT 2000a; URT 2005a). NSGRP is committed to the Millennium Development Goals (MDGs)[1], as internationally agreed targets for reducing poverty, hunger, diseases, illiteracy, environmental degradation and gender inequality, by 2015 (URT 2005a). Despite these efforts, poverty levels are high in Tanzania. By the year 2000 about half of the population was poor and about one-third lived in abject poverty (URT 2000a). There is a large and growing

[1] MDGs are internationally agreed goals/targets to address the needs of the world's poor by the year 2015. They include eradicating extreme poverty and hunger; achieving universal primary education; promoting gender equality and empowerment of women; reducing child mortality; improving maternal health; combating HIV/AIDS, malaria and other diseases; ensuring environmental sustainability; and developing a global partnership for development. For further information, refer to <http://www.un.org/millenniumgoals/>

disparity between urban and rural areas, with indicators of income poverty, survival and nutrition, human capabilities and the Human Development Index[2] clearly showing that poverty is more prevalent in rural areas (URT 2005b).

Information and Communication Technologies (ICTs) such as computers, telephones (fixed and mobile) and the internet have gained much attention as important tools for socio-economic development in developing countries (World Bank 1998; DOT force 2001; InfoDev 2005). As a result, in recent years, developing countries and their partners in the international development community have devoted considerable attention to the role that ICTs may play in promoting economic growth, combating poverty and attaining sustainable livelihoods (Gerster and Zimmermann 2003). The Tanzanian government appreciates the positive role of ICTs for socio-economic development and sustainable livelihoods (URT 2003a). NSGRP describes ICTs as a critical "soft" infrastructure that can accelerate productivity in the productive and service sectors, in government, business, teaching and in small and medium enterprises (SMEs) development (URT 2005a).

ICTs may play a role in the livelihoods of people in rural areas by facilitating access to information which can boost agricultural production and provide marketing information for agricultural products, hence improving farmers' income. ICTs may also improve poor people's access to education, health, government and financial services (Cecchini and Scott 2005: 73; Mathur and Ambani 2005: 348). ICTs can facilitate the availability of information that provides opportunities for diversification from subsistence production of traditional crops to the production of market-oriented high value agricultural products (Temu and Temu 2006). This would have an impact on rural livelihoods by increasing and diversifying the income of small-scale farmers through the exploitation of new market opportunities and existing market niches. ICTs may benefit farmers by enabling them to participate in co-operative activities such as participation in agricultural supply co-operatives which provide farmers with required inputs for agricultural production or marketing co-operatives which assist farmers in

[2] The Human Development Index (HDI) is a summary composite index that measures a country's average achievements in three basic aspects of human development. These are longevity, measured by life expectancy; knowledge, measured by adult literacy rate and gross primary, secondary and tertiary enrolments ratios; and a decent standard of living, measured by GDP per capita.

marketing their products (Sife, Lwoga and Chilimo 2004). ICTs may promote growth of other small-scale enterprises in rural areas and provide people with multiple and more sustainable livelihoods opportunities (Duncombe and Heeks 1999).

As a result of the attention given to ICTs as tools for socio-economic development, different organisations have made massive investments in ICTs and various projects have been initiated with the aim of making ICTs accessible to people in developing countries. In the developing countries context an example of such projects is the multipurpose community telecentres advocated by International Telecommunication Union (ITU), the International Development Research Centre (IDRC), United Nations Development Programme (UNDP) and United Nations Educational, Scientific and Cultural Organisation (UNESCO) (ITU 1998). Tanzania hosts one of the six African pilot telecentres within the framework of ITU/UNESCO/IDRC initiative. Telecentres were designed to experiment with new technologies, new forms of partnership and funding mechanisms and the experiences acquired in the pilot projects were meant to develop appropriate strategies for the application of ICTs for development and poverty reduction.

In many developing countries, telecentres have become hubs for rural connectivity and in many rural areas telecentres are the only places that provide internet services, computer training and other ICT related services to the public. In Tanzania, and in many other African countries, mobile phone services have experienced phenomenonal growth in recent years and cellular telephone is described as an 'ICT' that is bridging the digital divide in Africa and is considered the most significant entry point to the information society for Africans (Heeks 1999; Intelcon Research and Consultancy 2002). For these reasons, this study refers mainly to these two services when investigating the use of ICTs by people in rural areas of Tanzania.

In Tanzania, as is the case in many other developing countries, the benefits of ICTs are still unevenly spread, especially between urban and rural areas resulting in what can be termed as "urban–rural digital divide." Most ICTs facilities in developing countries are concentrated in urban areas (UNESCO 2003a). Ngalinda and Mutagahywa (2005) found that only six percent of households in Tanzania had access to fixed telephones and 90 percent of these were in Dar es Salaam. The same study revealed that 48 percent of people living in Dar es Salaam had

access to mobile phone, whereas in rural areas only eight percent of the population had access to mobile phones. In that regard, various steps have been put in place to facilitate access and utilisation of ICTs facilities in rural areas of Tanzania. Some of these steps include the adoption of a pro-poor national ICT policy and establishment of an independent communication regulatory authority, whose role, among others, is to ensure universal accessibility of ICTs facilities in the country (URT 2003a). Other measures include the establishment of telecentres in various areas of the country.

Experience from elsewhere shows that most telecentres have neither led to development, nor to the improvement of peoples' livelihoods, as expected (Kenny 2002; Maepa and Mphahlele 2004; Burton 2003: 198). Most of these ICT projects put much emphasis on the supply side of the ICT services such as developing the infrastructure, the hardware, the software and having appropriate policies, but little has been done to analyse the demand side of these services and therefore, as a result, these services are not effectively used to bring about the socio-economic development of people in rural areas (Heeks 2005a).

The purpose of this study is to investigate how, and for what purposes, ICTs are used by people in selected rural areas of Tanzania and to study the impact that ICTs have on the various aspects of their livelihoods. This investigation is carried out using ICT services provided by the telecentres and mobile phone services. The investigation uses the concept of sustainable livelihoods, with an asset/vulnerability approach (DFID 2001; Chambers and Conway 1992; Carney 1998), as a lens through which to assess the contribution to livelihood sustainability made by ICT services. The holism of livelihoods framework will help to describe the multi-dimensionality of poverty, which includes not only lack of income and financial resources, but also deprivation in terms of a lower likelihood of being able to live a long and healthy life and deprivation regarding increased access to the knowledge, education and resources which enable people to have a decent standard of living (UNDP 2002; World Bank 2003). The study assesses the extent of implementation of the Tanzania national ICT policy and the universal access policy and the degree to which these policies facilitate accessibility and utilisation of ICTs in the selected rural areas.

1.1 Background to the problem

Information and communication technologies (ICTs) involve innovations in microelectronics, computing (hardware and software), telecommunications and opto-electronics (UNDP 2001). These innovations allow the processing and storage of large amounts of information, along with rapid distribution of information through communication networks (UNDP 2001). ICTs include computers, the internet, telephones, radio and television. These technologies help in the delivery of information to where it is required, in a timely manner. ICTs multiply time, shorten distances and eliminate hierarchy and geographical boundaries. This leads to reduced costs of operations (Adeya and Cogburn 2001: 6). The collective legacy of ICTs is built on empowering people with the ability to communicate instantaneously, which is known to facilitate the development process by increasing efficiency, effectiveness and equity (Yonah 2002).

ICTs are now regarded as an important tool in development, which is increasingly becoming technology-oriented, and success in the global economy depends on access to information and communication technologies (Adeya and Cogburn 2001: 8). ICTs have been the driving force behind the global information society, in which information work predominates and information is regarded as a valuable resource. An information society is a society in which the creation, distribution and manipulation of information is a significant economic and cultural activity and where the production, distribution and consumption of knowledge and information are the driving forces for change (Dordick and Wang 1993). The information society is made possible by ICTs and is characterised by networking forms of activities in economy, society, politics and culture, which Castells (1996: 21) referred to as the networked society.

ICTs are regarded as powerful tools for socio-economic development (UNDP 2001; OECD 2004; Gills and Mitchel 2002). The World Bank (1998) and UNDP (1999) assert that ICTs have the potential to improve the welfare of the poor by providing opportunities to increase social capital; improved availability of market information; creation of new economic opportunities; improved economic efficiency and competitiveness; better access to health and

education facilities and more efficient and effective governance. ICTs have in fact made a new development paradigm possible (Hilbert 2001).

Various international initiatives have been initiated to facilitate the use of ICTs for development in developing countries and help bridge the digital divide. Some of these initiatives include the World Summit on Information Society, the G-8's Digital Opportunity Task Force (DOT Force); UNDP's Information Technologies for Development Initiative (Info21); the World Bank's Global Information and Communication Technologies Department (GICT); and the World Bank's Information for Development (InfoDev) initiative and the UN's ICT Task Force (UNICT Task Force 2002; WSIS 2003; UNDP 2000; GICT 2006; DOT force 2001; InfoDev 2006).

The role of ICT in fostering development and addressing the needs of the poor has been the subject of heated debate in recent years. This contestation has been attributed partly to a high failure rate of the ICTs for development projects, especially in developing countries (Benjamin 2001a; Chapman and Slaymaker 2002; Heeks 1999; Maepa and Mphahlele 2004). Myriad challenges involved in leveraging ICTs in poor countries which, in most case are overlooked or not taken seriously by the proponents of ICTs for development projects, is another source of controversy. The extent to which ICTs can be used to reduce poverty in poor countries is strongly contested (Heeks 1999; Mercer 2005; Wilson 2001).

Critics of "ICTs for development" say that ICTs are a waste of money, given the many other pressing development issues; that it would be best to divert resources from ICT development towards areas of greater impact and real need; that human beings face the risk of disillusionment with ICT, as ICT projects do not bring the benefits claimed; they also say that ICTs will not benefit but instead will harm people, by opening up new avenues for exploitation (Wyatt *et al.,* 2000: 3-8; Moodley and Cloete 2004).

Supporters of the "ICTs for development" view are generally saying that the divide between those who have access to ICTs and those who do not will become even greater if ICTs are not promoted; that ICTs will support other sectors in the economy and people's lives will improve

through investment in ICTs; that ICTs are precisely the tool to bring everyone into the "information age" and so ensure that the benefits of this form of social organisation are shared (WSIS 2003; InfoDev 2006; Chowdhury 2000; Heeks 2005b).

On the other side of the debate there are those who feel that, if used wisely, ICT can be effective in addressing development objectives, including the economic and social empowerment goals of the poor (SDC and GPK 2004; Mansell and Wehn 1998; Lewis 2004; Moodley and Cloete 2004). This view is supported by recent developments in the ICT sector, such as falling ICT costs, resulting from the declining cost of personal computers, development of open-source software solutions, the emergence of new cost-effective technologies such as wireless technologies and increased competition in the communications sector (SDC and GPK 2004).

Despite these developments the fact is that the gap between those who have access to ICTs and those who do not and between people living in urban areas and those living in rural areas of developing countries is still large (Bridges.org 2003). There is a wide gap between the expectations of what ICTs can do for poor people living in rural areas of developing countries and the reality of how these technologies are actually being used in these areas.

This study investigates how and for what purposes ICTs are used by people in selected rural areas of Tanzania so as to provide a balanced understanding of the relationship between ICTs, socio-economic development and sustainable livelihoods. The investigation will be done by taking into consideration local conditions and realities in these areas and hence move beyond an enthusiastic and a technological deterministic approach of the role of ICTs for poverty reduction to a more balanced view of ICTs for development.

To use the words of Moodley and Cloete (2004), in order to retain the “hope” that ICTs can play a role in development, it is necessary not to succumb to the seductive “hype” that surrounds technological developments. Álvarez and Calás (1996: 42) emphasise that, in order to fully understand the relationship between ICTs and poverty reduction, it is necessary to articulate multi-disciplinary and dynamic models capable of considering concurrently the

multiple realities, subjectivities and political agendas enabled by information technologies. These approaches should recognise the context in which these new realities are appearing and should be dynamic and proceed beyond simplicity.

1.2 Statement of the problem

Within the context of development, ICTs are regarded as tools for socio-economic development and sustainable livelihoods (Lewis 2004; SDC and GPK 2004; Mansell and Wehn 1998). There is an increasing commitment from international institutions to support this goal. The central question for developing countries is not whether ICTs should be introduced for development purposes, but rather what will be the best way to implement ICTs with a developmental focus and in a manner that facilitates developing countries to respond to the information society?

The ability to use and adapt ICTs is regarded as a critical factor for generating and accessing wealth, power and knowledge, which can be used to achieve socio-economic development (Castells 1998: 92). ICTs may also cause inequality, fragmentation of the society and social exclusion for those who are not able to use ICTs and participate in the network society (Castells 1998: 68-69). Disparities in the use of ICTs, generally known as the digital divide, exist throughout the world between rich and poor countries and between specific groups of people within countries (Bridges.org 2003). In developing countries telecentre projects are being used as a mechanism to bridge the urban/rural digital divide and to enable rural people to use ICTs for socio-economic development and sustainable livelihoods (Etta and Parvyn-Wamahiu 2003: 3-4). In the case of Tanzania, various initiatives are in place to ensure that ICTs become widely used for poverty reduction and sustainable livelihoods. There is also a political will within the government to facilitate this role (URT 2003a; URT 2005a).

Despite this strong belief in the role of ICTs for socio-economic development, clear evidence of how ICTs can be used to achieve this purpose in the Tanzanian context and elsewhere is lacking. There is a danger of people embracing the ‘technological determinism theory’ and therefore regarding ICTs as a panacea or a ‘magic bullet’ that will solve all development problems, without understanding the local context, or with ill-conceived expectations of how they would be used (Chacko 2004; Long and Long 1992: 19; Moodley and Cloete 2004;). A

report from the Swedish International Development Co-operation Agency (SIDA) (2005) pointed out that:

> Despite the strong belief in the role of ICTs in poverty reduction and large investments that have already been made, there has been little readily discernable hard evidence that demonstrates that the use of ICTs could be a significant contributor to poverty alleviation. In the case where there has been some evidence of benefits from the use of ICTs, there has been little indication that it could be cost-effective and applicable on a large scale (SIDA 2005).

Research findings from other African countries show that, even in places where rural ICTs access points such as telecentres are in place, these facilities are sometimes not used as effectively as expected, thus rendering their impact on socio-economic development and sustainable livelihoods minimal (Benjamin 2001b; Chapman and Slaymaker 2002; Maepa and Mphahlele 2004; Burton 2003: 198).

This study investigates how, and for what purposes, ICTs are used by people in selected rural areas of Tanzania and studies the impact that ICTs have on the various aspects of their livelihoods. This is important because different countries have different conditions which might result in different experiences with the use of ICTs for livelihoods strategies and socio-economic development. Mansell and Wehn (1998) explained that there is no universal "best practice" formula for adoption of information and communication technologies for socio-economic development, especially in developing countries, because of the diversity of conditions. This research will contribute positively to the ongoing discussion on ICTs for socio-economic development in Tanzania. It will be of particular interest to ICT policy-makers, promoters and managers of telecentres and other ICT projects in rural areas. The study will also provide valuable information to the implementation of the universal access policy which is currently in progress.

1.3 Purpose

The research question which this study investigated was: how and for what purposes ICTs are used by people in the selected rural areas of Tanzania and what is the impact of ICTs on the various aspects of their livelihoods?

1.3.1 Objectives

The specific objectives of the study were:

1. To establish the current status of ICT sector development in the selected rural areas of Tanzania.
2. To determine policies which are in place to facilitate development and utilisation of ICTs in the selected rural areas of Tanzania.
3. To examine the extent to which people in the selected rural areas of Tanzania have access[3] to ICTs.
4. To examine use patterns of ICTs by people in the selected rural areas of Tanzania.
5. To determine the impact of ICTs use on various aspects of the livelihoods of the people living in the selected rural areas of Tanzania
6. To identify barriers to effective utilisation of ICTs in the selected rural areas of Tanzania
7. To recommend a model for effective implementation of ICTs and their use for sustainable livelihoods in the selected rural areas of Tanzania

1.3.2 Research questions

In order to address the objectives of the study, answers to the following research questions were sought:

1. What is the current status of ICT sector development in the selected rural areas of Tanzania?

[3] The study will focus on the broader definition of access, which Bridges.org (2003) called 'real access' to ICTs. This is the kind of access that not only refers to the availability of the physical infrastructure but also focuses on all other factors that actually affect who can take full advantage of the ICTs in an effective way. These factors include affordability, integration of the technology into peoples' daily lives and routine, capacity of the people to use and understand the technology and whether or not there is relevant locally produced content.

2. What policies are in place to facilitate development and utilisation of ICTs in the selected rural areas of Tanzania?
3. To what extent do people in the selected rural areas of Tanzania have access to ICTs?
4. What are the use patterns of ICTs by people in the selected rural areas of Tanzania?
5. What is the impact of ICTs use on various aspects of the livelihoods of the people living in the selected rural areas of Tanzania?
6. What are the barriers to effective utilisation of ICTs in the selected rural areas of Tanzania?
7. What would be the appropriate model for effective implementation of ICTs and their use for sustainable livelihoods in the selected rural areas of Tanzania?

1.4 Preliminary literature study and reasons for choosing the topic

The significance of the study is mainly concerned with three major questions identified by Creswell (1994: 111). These include: why and how the study adds to the scholarly research and literature in the field; how the study helps to improve practice and why the study will improve policy-making in that particular field of study. This study is intended to establish the relationship between ICTs and livelihoods in rural areas of Tanzania. The
study is of particular significance as it provides a deeper understanding of the subject, based on empirical evidence. So far much theoretical information about ICTs and socio-economic development in Tanzania and elsewhere has been provided, with very little empirical evidence on the subject. Reliable data on rural ICT facilities, and how they can contribute to socio-economic development, is scant. This fact was underscored by Nielinger (2003), who pointed out that:

> Many articles have contributed to a deeper understanding of rural ICTs access for development and have brought valuable input for many pilots and start-ups. However, the debate is still in its infancy. Although ready-to-use concepts have been developed and key recommendations, technical and non-technical, are at hand, such approaches tend to be rather general and are normally derived from some elaborate desktop research rather than from individual or comparative field research.

The successful use of ICTs by communities involves addressing numerous obstacles and challenges. In many cases, ICT projects are poorly designed and implemented and even when successful, it may take decades to reap substantial benefits from them (SIDA 2005). The fact that these technologies are relatively new requires deeper research into how they can be effectively used for socio-economic development in order to fully understand them and to identify which aspects of poverty can be addressed using ICTs and which cannot. This study is important because, as developing countries (including Tanzania) and their partners in development and donor agencies make strategy and resource choices about how to deploy ICTs as tools of their core development goals and the achievement of the Millennium Development Goals (MDGs), they urgently need, and are calling for, more rigorous data, evidence and best practice guidance in the form of field-based experiments, research and analysis of how to use ICTs in an intelligent and cost-effective manner to achieve measurable results (InfoDev 2004). This need is particularly important because poorly-designed ICT interventions may waste the scarce resources of the country and its donor partners and even intensify existing inequalities (SIDA 2005). To emphasise further the need for more and different kind of research on ICTs for socio-economic development in developing countries, Keniston, Director of Ministry of Information Technology (MIT) in India, pointed out that:

> ICT for development commitments, stories and hopes are built almost entirely on an empirical vacuum. We know almost nothing about the factors that make for effectiveness or ineffectiveness of grassroots ICT projects in developing nations. But instead of research to counter or address such claims we have 'stories.' Some of these are true stories of success but it is impossible to make meaningful generalisations from them (Rothernberge-Alaami and Pal 2005).

Given the above, this research will have positive contributions to make to the ongoing discussion on ICTs for socio-economic development and is of particular interest to ICT policy-makers and all those interested in the field of ICTs for socio-economic development in rural areas, especially in developing countries.

1.5 Originality of the study

Originality of the study is mainly concerned with the extent to which the study makes a significant and original contribution to knowledge of facts and/or theories in the field of study (Phillips and Pugh 1994: 61). It is also concerned with the contribution of the study to something of practical relevance. Different characteristics of research endeavours have been identified as constituting originality. Some of these include: looking at areas that people in the discipline have not looked at before; being cross-disciplinary; using different methodologies from those frequently used; trying out something in a particular country that has previously only been done in other countries; applying existing theory in a novel way to a different population (Phillips and Pugh 1994: 6; Blaxter, Hughes and Tight 2001: 13; Remenyi and Money 2004: 100). Although this study draws on an extensive amount of information and studies which have been done in the field of ICTs for socio-economic development, not much has been done in the Tanzanian context. Consequently the outcomes of this study are peculiar to Tanzania and hence original, in that sense.

Much information which has been provided so far on the subject has been mainly based on desktop research and quantitative methods were mainly used in the survey studies (Chapman and Slaymaker 2002; Gerster and Zimmermann 2003; Kenny 2002; Gills and Mitchel 2002; Sife, Lwoga and Chilimo 2004; Gillwald 2005a). Most of the research done thus far has taken a supply side (making ICTs available) analysis of the impact of ICTs services for socio-economic development (Nielinger 2003; Tusubira, Kaggwa and Ongora 2005; Gillwald 2005a). This study therefore filled the gap left by previous studies, by providing empirical evidence on the subject, with a demand side (users and non-users' perspectives) focus of the impact of ICTs for socio-economic development hence investigating the relationship between ICTs and socio-economic development from the consumer's perspective. The present study broke new ground by specifically focusing on the contribution of ICT services provided by telecentres, as well as mobile phone services, on the livelihoods of people living in rural areas.

The study used a combination of quantitative and qualitative methods. The study adopted a discipline-triangulation approach, by including information science, ICT policy and regulation

and development studies fields. This approach was achieved by linking ICT use and accessibility issues to rural livelihoods, as well as to the national ICT policy and regulatory framework.

In this way the study made an original contribution to knowledge. Furthermore, the analysis of data that was collected for this study involved processes which went beyond summarising and describing the data. The analysis involved looking for explanations, reasons, influences; causes and generalisations. Such processes, as explained by Oliver (2004) are likely to make an original contribution to knowledge.

1.6 Assumptions of the study

This study is being guided by the following assumptions:

- Effective implementation of ICTs is a key for socio-economic development and sustainable livelihoods;
- Physical access to ICTs alone does not necessarily guarantee the effective use of these technologies, specifically for reducing poverty;
- In many developing countries poverty will not be eradicated by ICTs alone. Equally, poverty will not be eradicated without these technologies;
- It may be difficult to measure empirically how ICTs can reduce poverty for individuals, but an attempt will be made to at least assess the impact that these technologies have on rural livelihoods and how these technologies can be used to bring develop and reduce poverty at a community level;
- If barriers to effective implementation of ICTs for socio-economic development and sustainable livelihoods in rural areas are clearly understood and their effects well articulated, it will be easy to start working on those barriers, to reduce their negative impact.

1.7 Definition of key concepts - Operational definitions

In order to have a common understanding of the concepts that surround the discussion on the use of ICTs for socio-economic development and sustainable livelihoods, the following section provides operational definitions of the terms used in this study.

1.7.1 Development

Early development economists believed that economic growth would improve a wide range of health and education indicators and therefore they used per capita Gross National Product (GNP) as the definition of development (World Bank 2004; Rasmussen 2001: 13). The experience of the 1950s and 1960s, showed that a large number of developing countries did achieve the overall United Nations growth targets, but the standards of living of the masses of people remained, for the most part, unchanged. Therefore there was a need to broaden the definition of development to include indicators that go beyond economic growth (Rasmussen 2001: 13). Today a country's development stage is measured against six overall indicators. The indicators are poverty, education, gender, mortality, health and environment (World Bank 2004).

This study uses a broad definition of development and adopts the definition of development by UNDP (2001), which states that "development is the process of creating an environment in which people can lead productive, creative lives, in accordance with their needs and interests. Development is thus about expanding the choices people have to lead lives that they value" The central purpose of development is the creation of an enabling environment in which all can enjoy long, healthy and creative lives. UNDP (2002) explains that fundamental to enlarging human choices is building human capabilities and the most basic capabilities for human development are leading a long and healthy life, being educated, having access to the resources needed for a decent standard of living and being able to participate in the life of the community. Development involves the ability of a society to add value to material and non-material resources. This is the key for generating local wealth and an important factor in contributing to a more equitable distribution of new wealth. To add value is to add to the information content of resources (Vitro 1990: 87). Development requires strengthening the physical infrastructure and intellectual or creative resources (Rasmussen 2001: 13).

1.7.2 Sustainable human development

The mostly widely used definition of sustainable human development is the definition by Bruntland (1987: 43), who defined it as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. UNDP

(2005a) defined sustainable development as a paradigm of development that puts people, their ongoing needs and aspirations, at the centre of its concerns, that not only generates economic growth but distributes its benefits equitably and that regenerates the environment and empowers people.

Bruntland (1987: 44) pointed out that high levels of economic growth and widespread poverty can co-exist, hence sustainable human development requires that societies meet human needs both by increasing productivity potential and by ensuring equitable opportunities for all. Because of their existing position of fewer opportunities, a sustainable development paradigm gives priority to the poor, enlarging their choices and opportunities and providing for their participation in decisions that affect their lives.

1.7.3 Sustainable livelihoods

A livelihood comprises capabilities, assets (including both material and social resources) and activities which are required for living. A livelihood is sustainable when it can cope with, and recover from, stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base (Chambers and Conway 1992; Ashley and Carney 1999; Carney 1998).

Sustainable livelihoods is a framework which was developed by the Department for International Development (DFID) as an improved way of thinking about the objectives, scope and priorities of development, that will better meet the needs of the poor, both at project and policy level (DFID 2001). The framework puts people at the centre of development. The sustainable livelihood framework, as proposed by DFID, takes an asset/vulnerability approach to analysis of the livelihoods of poor people and starts with the experience of poverty as the lack of secure conditions of life. The framework aims at reflecting the complex range of assets and activities on which people depend for their livelihoods and recognises the importance of assets that poor people do not own.

The sustainable livelihoods framework is concerned with the range of capital assets which individuals, households and communities access and use in order to sustain themselves. These include:

- Human capital, which includes skills, knowledge and ability to work or produce;
- Social capital, which includes networks, participation in social or productive groups and mutually-beneficial relationships;
- Natural capital, which includes natural resources;
- Physical capital, which includes buildings, infrastructure (including power and water) and productive tools;
- Financial capital, which includes funds available for investment, production and consumption. (see section 3.4.4 in Chapter Three for detailed explanation of the capital assets).

The sustainable livelihoods framework is also concerned with the vulnerability context of the people, which explains that people's lives, particularly those of the poor, are strongly affected by three groups of factors, which make them (and their assets) vulnerable and which are outside their control. These are:

- Trends such as population change, national and international economic trends and technological change;
- Shocks such as natural disasters, epidemics, civil conflict and economic crises;
- Seasonal variations in prices, costs, production, food supply and economic opportunity.

The sustainable livelihoods framework used in this study is explained in detail in section 3.4.4 of Chapter Three.

1.7.4 Poverty

Poverty describes a wide range of circumstances associated with need, hardship and lack of resources. Poverty describes a low level of income that is not sufficient to allow the purchase of all the resources required to live. Low levels of income are measured by a threshold defined by the World Bank as income below the poverty line of $1 per person per day (World Bank 2003). Poverty connotes deprivations in three aspects of human development, meaning

being deprived of living a long and healthy life; being deprived of increased knowledge and education and being deprived of resources which enable people to have a decent standard of living (UNDP 2002; Sen 1998).

A report from SIDA (2005) states that at the core of every definition of poverty is the inability to provide food and shelter for a family. Enhancing livelihood opportunities is thus a key requirement in relieving poverty. ICTs have been shown to be effective at both enhancing traditional livelihoods and at allowing the creation of new ones. Simple examples of enhancements of livelihoods by ICTs include providing farmers with weather forecasts or crop information. New livelihoods enabled by ICTs include web-based businesses and telephone access resellers. Development, such as in the agricultural sector, may be an effective means of reducing poverty.

1.7.5 Rural areas

This study adopts the definition of the International Telecommunication Union (ITU) of rural and remote areas, which describe rural areas in terms of the development of the ICT sector (ITU 2000). According to this definition, a rural area exhibits one or more of the following characteristics:

- Scarcity or absence of public facilities such as reliable electricity supply, water, access roads and regular transport;
- Scarcity of technical personnel;
- Difficult topographical conditions such lakes, rivers, hills, mountains or deserts, which render the construction of wire telecommunication networks very costly;
- Severe climatic conditions, that make critical demands on equipment;
- Low levels of economic activity, mainly based on agriculture, fishing or handicrafts;
- Low per capita income;
- Underdeveloped social infrastructures such as health and education;
- Low population density;
- Very high calling rates per telephone line, reflecting scarcity of telephone services and the fact that large numbers of people rely on a single telephone line.

According to ITU (2000), these characteristics make it difficult to provide public telecommunication services of acceptable quality by traditional means at affordable prices, while also achieving commercial viability for the service.

1.7.6 Information and communication technologies

Information and communications technologies (ICTs) involve innovations in microelectronics, computing (hardware and software), telecommunications and opto-electronics. These innovations enable the processing, manipulation and storage of large amounts of information, along with rapid distribution of information electronically in digital form through communication networks (UNDP 2001). ICTs can be divided into the following categories: New ICTs; these include computers, satellites, wireless one-on-one communications (including mobile phones), electronic mail (email) and internet. Old ICTs; these include radio, television, landline telephones and telegraph (SIDA 2005).

To further define ICTs and differentiate them from other information-handling technologies Heeks (1999) divides information handling technologies as follows: ICTs which are based on digital information held as 1s and 0s and comprise computer hardware, software and networks. Other information-handling technologies include 'intermediate' technologies, which are based on analogue systems such radio, television and telephone; 'literal' technologies, which are based on information held as written word, such as books and newspapers; and 'organic' technologies such as the brain and sound waves. Heeks (2002: 1) explained that ICTs reflect the convergence of digital computing and telecommunication. Computers were largely focused on the processing of information, whereas ICTs undertake the processing and communication of information. Chapman, Slaymaker and Young (2005) pointed out that ICTs are not confined to the internet. They include instruments, processes, tools and methodologies that enable people to communicate, meet and share experiences, lessons and knowledge, by electronic means. ICTs are essential means of exchanging information.

1.7.7 Telecentre

A telecentre is a public facility in the community that affords people the opportunity to use computers, networks, photocopiers, scanners, telephones, printed materials and audio and

video resources for information-searching, communication, training and entertainment. The services provided in telecentres are either free or available at an affordable cost. The primary mission of a telecentre is community services compared to internet cafés whose primary mission is profit (Colle 2002).

1.7.8 Teledensity

The International Telecommunication Union (ITU) (1999) defines teledensity as the number of main telephone lines per 100 inhabitants. Teledensity is the most widely used indicator for comparing the penetration of telephone services in nations.

1.7.9 Universal access/universal service to ICTs

The term universal service is normally used interchangeably with the term universal access, but technically they mean two different things. Universal service to ICTs means the availability of ICTs services to individual subscribers, usually measured by household penetration. Universal access means being able to use ICTs, often via "public provision" through publicly available services such as telephone booth, public accessed internet cafés or community telecentres. The term universality is normally used to refer to both universal access and universal service (Intven and Tetrault 2002).

Due to the poorly developed ICTs infrastructure in many developing countries, together with the high levels of poverty, the universality focus from a development perspective is commonly on universal access, rather than on universal service (Benjamin and Dahms 1999). This perspective is especially the case when ICT is considered more broadly than telephony and include the use of the internet. Therefore, the strategy for developing countries is not universal service, but universal access at a community level. This is a more cost-efficient way to deliver services, particularly to people who are poor.

1.7.10 Digital divide

The digital divide is a social/political issue referring to the socio-economic gap between communities that have access to ICTs facilities and those who do not (Reitz 2007). The term also refers to gaps that exist between groups regarding their ability to use ICTs effectively, due to differing levels of literacy and technical skills. The digital divide is generally related to

social exclusion and inequality of opportunities to access and use ICTs. OECD (2001) defined digital divide as the gap between individuals, households and geographic areas at different socio-economic levels, with regard to their opportunities to access and use ICTs.

1.8 Scope and limitations of the study

This study investigated how, and for what purposes, ICTs are used by people in the selected rural areas of Tanzania and studied the effect that ICTs have on the various aspects of their livelihoods. The study used the sustainable livelihood framework in establishing the relationship between ICTs and livelihoods. The study investigated the effect of ICTs on only three of the five assets in the sustainable livelihoods framework. These include social capital, financial capital and human capital. Access to these three assets seems most likely to be susceptible to the characteristics of ICTs. Therefore the study did not use the whole sustainable livelihoods framework.

In establishing the relationship between ICTs and economic development, the present study looked only at the broad economic impact of ICTs on the economic activities of the people in these communities. Beyond the scope of this study were the quantitative calculations and measurements of the impact that ICTs have on the financial or economic wellbeing of the people living in these areas. The study examined the generic economic influence of ICTs on the livelihoods of people.

In investigating the use of ICTs for socio-economic development and sustainable livelihoods, the study covered only selected rural areas of Tanzania with telecentres. Therefore, the study was confined to rural areas with telecentres only, which in most cases were district headquarters which comply with the ITU (2000) definition of rural and remote areas. The situation and experiences with the use of ICTs for socio-economic development and sustainable livelihoods in other rural areas where there are no telecentres may be different. Rural areas located very remotely and far away from the district headquarters were beyond the scope of this study.

In investigating the use of ICTs for socio-economic development and sustainable livelihoods the study was limited to ICTs services provided by the telecentres and other ICTs services in

these communities, such as mobile phones. The study investigated national policies and strategies for the development of the ICT sector and its utilisation for socio-economic development and sustainable livelihoods. Due to the nature of this study it was difficult to measure empirically how ICTs reduce poverty for individuals. However, an attempt was be made to at least assess the impact that these technologies have on livelihoods of the people in rural areas and how these technologies can be used to bring about socio-economic development and sustainable livelihoods at community level.

1.8 Methodology

The purpose of this study was to investigate how, and for what purposes, ICTs are used by people in selected rural areas of Tanzania and to study the impact that ICTs have on the various aspects of their livelihoods. This investigation was carried out by examining the use of ICTs in rural areas of Tanzania where telecentres have been established. The study used four telecentres as case studies. The study used primary and secondary data (sources of information). Primary data was collected using interviews, focus group discussions and observation. Secondary data was gathered by the review of literature relevant to this study. The review involved books, journal articles and conference proceedings, policy documents and legislation and reports from various national, regional and international organisations dealing with ICTs in developing countries.

The study administered a structured interview protocol to users and non-users of the telecentres. Semi-structured interview protocols were administered to managers of the telecentres and officers from the ministry responsible for ICTs in Tanzania (the then Ministry of Infrastructure Development – MoID[4]), The Tanzania Communication and Regulatory Authority (TCRA) and a national research institution (The Commission for Science and Technology- COSTECH). The study carried out focus group discussions with users and non-users of the telecentres, employing pre-determined questions and themes. Critical observation of the issues that were relevant to the study was made at the telecentre and the surrounding communities.

[4] Up to the year 2006 the ministry responsible for ICTs in Tanzania was called the Ministry of Transport and Communication. In September 2006 it was changed to the Ministry of Infrastructure Development. The name was changed again in May 2008 to the Ministry of Communications, Science and Technology.

Qualitative data derived from the interviews and focus group discussions was analysed using Nvivo, whereas quantitative data was analysed using SPSS. Data presentation involved using graphs, tables and narrations. The methodology used in this study is explained in detail in Chapter Four.

1.10 Structure of dissertation

Chapter One

This chapter provides general introductory information about the study. It includes background information of the study, statement of the problem and objectives of the study, significance and assumptions of the study and a brief outline of the methodology used to carry out the study.

Chapter Two

This chapter explains where the study will be conducted. It describes the specific areas and shows the rationale for choosing those particular areas.

Chapter Three

This chapter presents the review of literature related to the study, to position the study within other similar studies and explore the available knowledge in the study area.

Chapter Four

This chapter presents the procedures and methods used to carry out the study. It explains the entire research design and the methodologies used. The chapter also explains data collection methods and statistical procedures used in analysing the data.

Chapter Five

This chapter presents the results pertaining to the study. In this chapter data is presented in the form of figures, tables and narrations.

Chapter Six

Chapter Six presents the meaning of the empirical results in the context of the study and interprets the implications of the results. It provides explanations and reasons for the results obtained.

Chapter Seven

This chapter summarises the findings and concludes the study. The chapter presents recommendations based on the research questions of the study. Finally it suggests areas for further research.

1.11 Summary

Chapter One set the scene for the study and described the enquiry as an attempt to fill some of the gaps left by the previous studies in investigating the use of ICTs for socio-economic development and sustainable livelihoods. Several issues were discussed in this chapter. These included background to the problem, statement of the problem, and the objectives of the study. Other issues include the study rationale, assumptions of the study, methodology, definition of key concepts, study scope and delimitations and an outline of the thesis.

Key issues that emerged from Chapter One are that ICTs have gained much attention as important tools for socio-economic development in developing countries. However, reliable data on rural ICT facilities, and how they can contribute to socio-economic development, is scant. It emerged that that although much literature has been provided on ICTs and socio-economic development in Tanzania and elsewhere, a good deal of this information is theoretical, with very little empirical evidence.

Chapter One shows that, at the moment, many developing countries (including Tanzania) and their partners in development and donor agencies are making strategy and resource choices about how to deploy ICTs as tools of their core development goals. Therefore more research-based evidence is required to ascertain which aspect of poverty can be alleviated using ICTs and how to use ICTs in an intelligent and cost-effective manner to achieve measurable results.

CHAPTER TWO
STUDY AREA, POVERTY LEVEL, POLICIES AND ICT SECTOR DEVELOPMENT IN TANZANIA

2.0 Introduction

The major purpose of this chapter is to describe the study areas and to put them in the context of the overall Tanzanian conditions. The chapter presents a short description of Tanzania. It explains the poverty level in Tanzania and policies which are currently in place to address poverty. The chapter examines ICT sector development in Tanzania. It explains policy and regulatory issues that govern ICT sector development in Tanzania. The chapter describes the four districts where the telecentres are located.

2.1 The area of study

The scope of this study is Tanzania, with particular focus on Karagwe, Magu, Ngara and Sengerema districts. The following section provides an overview of the study area.

2.1.1 Overview of Tanzania

The United Republic of Tanzania is the largest country in East Africa. Its covers 940,000 square kilometres, which include Tanzania mainland and the islands of Zanzibar (URT 2006a). Geographically, Tanzania lies south of the equator and borders eight countries: Kenya and Uganda to the north; Rwanda, Burundi, the Democratic Republic of Congo and Zambia to the west; and Malawi and Mozambique to the south (URT 2004a). Administratively, Tanzania mainland is divided into 21 regions and the island of Zanzibar into five regions. Each region is subdivided into districts (129 in total), each district into wards (2,787) and each ward into villages (URT 2004b; URT 2006a).

2.1.2 Population

According to the 2002 census, Tanzania had a population of 34.6 million. Of the 34.6 million people 16.9 million people are males and 17.7 million are females. The growth rate of the population is 2.9 percent per annum (URT 2000b: 87). The Tanzanian population is sparsely

distributed, with about 39 persons per square kilometres (URT 2002b). The life expectancy at birth for Tanzanian is 46 years and adult literacy rate stands at 69.4 percent (UNDP 2005).

2.1.3 Economic conditions

Economically, Tanzania is one of the poorest countries in the world, with a GDP per capita of US$294 (URT 2004b). The prevalence of income poverty is high in Tanzania, with 35.7 percent of the population living below the poverty datum line of one US dollar per day (URT 2005a). Tanzania has a Human Development Index (HDI) of 0.418 and it ranks 164 out of all countries in the world in terms of Human Development Index (UNDP 2005). In 2004 Tanzania experienced a GDP growth rate of 6.7 per cent, which exceeded the targeted level of an annual increase of six per cent (URT 2005c). However, much of this growth was attributed to the macroeconomic reforms which the country adopted in the 1990s. Therefore this growth rate caused only a small reduction in rural poverty rates, because poverty is deeper among rural households than among urban households. The challenge that the country is currently facing is how to sustain this growth rate and ensure that the benefits of growth are broadly shared (URT 2005c).

Agriculture[5] remains by far the sector with the largest share of the GDP in Tanzania Its share averages approximately 50 percent since 1990 (Intelcom Research and Consultancy 2002; URT 2005a). However, topography and climatic conditions limit the overall cultivated area to only 5.5 percent of the arable land area (URT 2005c). Major cash crops grown in Tanzania are tea, tobacco, sisal, coffee, cashew nuts and cotton (URT 2004b). Other sectors of economic significance are mining and tourism. By the year 2004 the contribution of various sectors to the Tanzanian GDP was as is shown in Table 2.1.

[5]In this section the study refers to agriculture in Tanzania in general which includes large scale and small scale, cash crops and food crops cultivation. However, in the areas where this study was conducted only small scale cultivation of both food and cash crops was being practised

Table 2.1: Sectoral contribution to GDP

Sector	Contribution to GDP (%)
Agriculture	46
Mining	2
Manufacturing	7
Utility (electricity and water)	2
Construction	6
Commerce	11
Transport	3
Communication	1
Finance	13
Administration	9

Source: URT (2004b)

2.1.4 Tanzania and rural development

Tanzania is one of the most rural countries in Africa, with over 70 percent of the population living in rural areas (Intelcom Research and Consultancy 2002; URT 2005c). This is above the African average of 65 percent (UNDP 2003). The major economic activity in rural areas of Tanzania is agriculture, which is mainly driven by smallholder producers. Other livelihoods activities in rural areas of Tanzania include small-scale businesses, fishing and livestock-keeping. (see section 4.6.3 in Chapter Four).

These smallholder producers, in most cases, have limited education and experience, are frequently exposed to shocks and have to deal with weak institutional arrangements for production. This has led to low increases in agricultural production and insufficient improvement in the quality of production (URT 2005c). Other constraints facing the agricultural sector in Tanzania include over dependence on rain-fed agriculture; poor research-extension-farmer linkages; low participation of farmers in decision making; low status of agro-processing industry; poor post-harvesting systems and poor policies. The impacts of these constraints are often aggravated by a serious lack of access to reliable and timely agricultural information by not only farmers, but also extension workers, researchers, policy makers and other stakeholders (Chailla 2001).

According to the Tanzanian Household Budget Survey of 2002, 80 percent of the poor in Tanzania are rural (URT 2002b) and 81 percent of the poor live in households where the main economic activity of the head of the household is agriculture. Agriculture employs more than 70 percent of Tanzanians (Intelcom Research and Consultancy 2002; URT 2002a). Agriculture therefore deserves prominence in the discussion of growth and poverty. The low rate of agricultural growth is perhaps the main reason why reduction in rural poverty is slow, despite the recent high growth rate of the economy as a whole. Significant poverty reduction depends on higher growth in the rural economy and particularly in the agricultural sector (URT 2005c).

Improved rural growth will depend on increased productivity and quality in agriculture. Experience shows that agriculture, including forestry and fisheries, is a powerful engine for development, helping to increase food security and lower food prices, create employment and generate income for the rural poor, alleviate rural and urban poverty; protect and conserve the environment, stimulate development in the rest of the economy, and ensure overall prosperity through the stimulation of global trade and greater global political stability (Kapange 2000).

ICTs, if properly deployed, can play an important role in promoting growth of the agricultural sector in rural areas. ICTs may help farmers get access to information that can help them make the best use of other resources at their disposal (Ozcatalbas, Brumfield and Ozkan 2004), as well as assist them to communicate fast and conveniently. Cecchini and Scott (2005) asserted that ICTs can help farmers by connecting them to markets. UNDP (2005b) saw ICTs as an increasingly powerful tool that can allow rural farmers to participate in global markets, improving the delivery of basic services and enhancing local development opportunities.

Howard, Fox and Turvey (1996) stated that information influences agricultural production by affecting the economic quantity and timing of inputs and activities, ranging from quantities of fertiliser, timing and quantity of irrigation and the timing and efficacy of risk-reducing and production-enhancing inputs. Knowledge and information are basic ingredients of food

security and are essential for facilitating rural development and bringing about social and economic change (Munyua 2000: 98).

Rural areas should be given priority as far as the overall economic development of Tanzania is concerned. Poverty reduction strategies should adequately address the agricultural sector and people living in rural areas. ICT sector development in rural areas should be given priority, to give farmers access to ICT tools. This will help them increase agricultural production and give them more opportunities for marketing their agricultural products.

2.2 Tanzania poverty reduction strategies and policies

Poverty is a major problem in developing countries, particularly in countries of sub-Saharan Africa. Different strategies and policies are used by developing countries to address poverty. Some of these strategies are initiated by the individual countries themselves, but the most commonly used strategies are the Poverty Reduction Strategy Papers (PRSP), which developing countries prepare under the World Bank and International Monetary Fund framework.

Poverty Reduction Strategy Papers (PRSP) are prepared by member countries (mainly developing countries) through a participatory process involving domestic stakeholders, as well as external development partners, including the World Bank and International Monetary Fund (IMF 2007). These strategies are normally updated every three years and annual progress reports are normally prepared and submitted to the World Bank and IMF. PRSPs describe the country's macroeconomic, structural and social policies and programmes over a three-year or longer period, to promote broad-based growth and reduce poverty, as well as the associated external financing needs and major sources of financing (IMF 2007).

The PRSP were introduced by the World Bank and IMF in 1999 under the programme called Enhanced Highly Indebted Poor Countries initiative (HIPC) (HIPC 2006; IMF 2006). Under this programmes Tanzania and over 45 other highly indebted countries were required to produce strategies for poverty reduction, after nationwide consultations. The strategies were to be approved by the IMF for countries to qualify for aid and debt relief.

The Tanzanian government has had poverty eradication as its main goal since independence in 1961. Various policies and strategies have been enacted aiming at addressing the challenge of poverty (URT 2006b). According to URT (2006b), a strategy is viewed as an instrument for channelling national efforts towards broadly agreed objectives and specific inputs and outputs. The elaboration and implementation of the strategy are ongoing processes. The Tanzania national programme for poverty reduction is nested within the ongoing economic reform programme and articulated in a number of policy initiatives and strategies. Some of these initiatives are home-grown, but others are adopted through multilateral organisations such as the IMF and World Bank. These strategies and initiatives include the following.

- National Poverty Eradication Strategy (NPES) of 1997;
- Development Vision 2025 of 1999;
- Poverty Reduction Strategy Paper (PRSP) of 2001; and
- National Strategy for Growth and Reduction of Poverty 2005.

2.2.1 National Poverty Eradication Strategy (NPES) and Development Vision 2025

In addressing the key challenge of strategising to reduce pervasive poverty, Tanzania prepared and adopted the National Poverty Eradication Strategy (NPES) in 1997 (URT 1997c). The NPES was to be implemented under a programme called Development Vision 2025, which was adopted in 1999 (URT 1998). The NPES is a Tanzanian home-grown plan which aimed at providing a framework to guide the poverty eradication initiative in order to reduce absolute poverty by the year 2025.

The plan includes developing industries, improving access to education and boosting agriculture, which is the backbone of the Tanzanian economy (URT 1997c). The NPES has identified three areas of strategic interventions, namely those creating an enabling environment for poverty eradication, those building the capacity for poverty eradication and those eradicating poverty. The strategy has spelt out strategies at various levels for poverty eradication initiatives (URT 1997c).

2.2.2 Poverty Reduction Strategy Paper (PRSP)

The Tanzanian Poverty Reduction Strategy Paper (PRSP) was effectively adopted in 2000. The PRSP was an integral part of ongoing macro-economic and structural reforms that are being supported under the IMF and World Bank framework, through the Enhanced Highly Indebted Poor Countries (HIPC) initiative, as explained in section 2.2 (HIPC 2006; IMF 2006). The Tanzanian PRSP was a three-year plan which covered the period 2000/01 to 2002/2003 (URT 2000a).

The objective of the HIPC initiative was to offer assistance to countries facing unsustainable debt obligations (HIPC 2006; IMF 2006). Proceeds from debt relief were supposed to be used to enable these countries to commit their resources to sustainable development and reducing poverty and improving the delivery of education and health services. In the case of Tanzania, debt relief and other resources were mainly channelled into "priority sectors" of education, health, water, agriculture, rural roads, the judiciary and land. Spending on these areas was considered to have a greater impact on poverty reduction (URT 2005a).

However, the evaluation report from the government, after the three years of operation of the programme, indicated that, although there was a slight improvement, generally the resources provided under this initiative were not sufficient for the "priority sectors" to achieve the envisaged goals and targets over three years. Poverty and inequality levels were still high (URT 2005a). The implementation of PRSP focused more on non-income poverty at the expense of income poverty. Hence, more emphasis was given to the social sectors rather than to investment in productive sectors of the economy, which could have generated sustainable increases in the income opportunities of the poor (URT 2004c).

It was observed that PSRP accorded low priority to the agricultural sector, which is the key to poverty reduction in Tanzania. Since the PRSP provides generously for poverty reduction, a substantial portion should have been set aside as core capital for the agricultural bank to kick-start agriculture into a vibrant industry (Mokhiber 2003). The lower priority given to the agricultural sector and income poverty by PRSP over the three years of its implementation, led to very slight achievements in rural areas, especially with regard to improvements in

agriculture. There was very little achievement with regard to accessibility to inputs, markets and water supply, in rural areas.

PRSP, being a donor-driven initiative, was criticised for a number of reasons. For instance, some Tanzanian development experts argued that the formulation of the PRSP had effectively rendered the home-grown NPES redundant. This is because, in theory the PSRP was supposed to work in parallel with the NPES to achieve Vision 2025, but, in practice, most funding was allocated to achieving the PRSP targets which were less ambitious than the NPES targets (Mokhiber 2003).

Another complaint about the PRSP is that civil society inputs in the preparation of the Tanzania PRSP were limited. Civil society had little influence on the initial policy content of the PRSP (URT 2004c). Holtom (2007: 245) urged that the narrow and truncated 'participatory' process through which Tanzania's PRSP was drafted, coupled with government's initial reluctance to open up the PRSP process to civil society and the structural limits placed on its participation by pre-existing conditions, meant that membership of Tanzania's policy network remained narrow.

Consequently, ownership of the PRSP by different groups of people in Tanzania has been mixed, depending on their involvement in the process (Holtom 2007: 239). Ownership is ultimately judged by commitment to the strategy. In the case of Tanzania commitment to the strategy was high at top leadership level and low among civil society organisations and the parliament, which was marginally involved in the preparation of the PRSP (URT 2004c). In order to extend the political legitimacy of the process and ensure sustainability, it is imperative to bring the parliament more formally into the process.

The PRSP duration ended in 2003 and a new follow-up strategy called the National Strategy for Growth and Reduction of Poverty (NSGRP) was launched in June 2005. All the weakness identified above are hoped to be addressed in the NSGRP in the years 2005/2006 to 2009/2010.

2.2.3 National Strategy for Growth and Reduction of Poverty (NSGRP)

In June 2005 the reviews of the PRSP of 2000/2003 was completed and a new strategy called the National Strategy for Growth and Reduction of Poverty (NSGRP) was launched. The NSGRP was expected to last for five years, from 2005/2006 to 2009/2010 (URT 2005a). In Tanzania this strategy is better known by its Swahili acronym of MKUKUTA (*Mkakati wa Kukuza Uchumi na Kuondoa Umaskini Taifa)*, meaning National Strategy for Growth and Reduction of Poverty (NSGRP). The NSGRP is informed by the aspirations of Tanzania's Development Vision (Vision 2025) for high and shared growth, high-quality livelihood, peace, stability and unity, good governance, high-quality education and international competitiveness. It is committed to the Millennium Development Goals (MDGs), as internationally agreed targets for reducing poverty, hunger, disease, illiteracy, environmental degradation and discrimination against women by 2015 (URT 2005a).

The strategy pays attention to stimulating domestic saving and private investment response, infrastructure development, human resource development, increased investments in quality education, science and technology and use of ICTs for a competitive, knowledge-based economy and an efficient government (URT 2005a). With the understanding of the fact that poverty has many dimensions, often caused and reinforced by underlying unequal distribution of resources, incomes and opportunities, the strategy identifies three major clusters of poverty reduction. Outcomes, goals and targets to be reached by 2010 have been set under each cluster. These clusters are:

Cluster I. Growth and reduction of income poverty: where the strategy aims at accelerating the GDP growth rate to attain a growth rate of 6-8 percent per annum by 2010, increasing agricultural growth from 5 percent in 2002/03 to 10 percent by 2010, reducing unemployment from 12.9 percent in 2000/01 to 6.9 percent by 2010 and addressing underemployment in rural areas. Other aims include increasing technological innovation, the upgrading and use of technologies and reducing the proportion of the rural population below the basic needs poverty line from 38.6 percent in 2000/01 to 24 percent in 2010.

Cluster II. Improvement of the quality of life and social well-being: where the strategy aims at increasing enrolments at all levels of education, reducing infant mortality from 95 in 2002 to 50 in 2010 per 1,000 live births, reducing maternal mortality from 529 to 265 in 2010 per 100,000, increasing the numbers of the urban population with access to clean and safe water from 73 percent in 2003 to 90 percent by 2009/10.

Cluster III. Good governance: where the strategy aims at developing structures and systems of democratic governance that are participatory, representative, accountable and inclusive and to put in place an effective public service framework to provide foundation for service delivery improvements and poverty reduction and to provide an equitable allocation of public resources, with corruption effectively addressed.

2.2.4 Communication Strategy for the National Strategy for Growth and Reduction of Poverty

In July 2005 the government launched another policy document called the Communication Strategy for the National Strategy for Growth and Reduction of Poverty (URT 2005b). The major aim of the communications strategy was to set out an overarching framework for communicating key messages on the NSGRP and mainstreaming the participation of all stakeholders in its implementation. The document aimed at enlisting greater dialogue, which would be achieved through the institutionalisation of a two-way communication between government and other stakeholders, raising awareness, facilitating opportunities for public discourse, sharing knowledge and enabling information from grassroots level to reach decision-makers to inform evidence-based planning at all levels.

To sum up the discussion on the Tanzania poverty reduction policies and strategies, suffice it to say that the poverty reduction strategies initiated by the IMF and the World Bank, being donor-driven initiatives, were not without criticism. In some cases such initiatives served the interest of donors more than the interests of the poor people. For instance, in the case of Tanzania, Mbilinyi (2000) said that through these International Financial Institutions (IFIs) processes for poverty reduction, government departments are more oriented towards donor

agencies, than towards their own citizens. In other words, they hold themselves accountable to the donors and not the citizens or civil society organisations.

The strategies of the IFIs are also criticised for having fault processes that do not strengthen domestic capacity to formulate policies and do not facilitate national ownership of these policies. The IFIs do not encourage that alternative roads to achieve poverty reduction be considered, investigated or tested (Hermele 2005). As a result, the effect of these policies on poverty reduction has been minimal and, in many developing countries, including Tanzania, poverty seems to be in resistant to these policies.

2.3 Telecommunication sector reforms

At the turn of the twenty-first century, a wave of reforms is sweeping the world, affecting all countries and sectors, particularly telecommunications. This sector has been most affected by dramatic changes in technologies, markets and the global economy, as well as a growing realisation of the central role of effective telecommunications in enhancing productivity and providing a basis for competitive advantage (Madden and Savage 1999: 65). In the developing world, the impetus for telecom reform has stemmed from three closely interrelated factors: the poor performance of state-owned telecom providers, changes in technology undermining traditional arguments for monopolistic provision and pressure by the World Bank, IMF and other international organisations (Jamali 2003: 34; Njuguna 2006).

Following these global trends on telecommunication sector reform, which are characterised by liberalisation, privatisation and regulatory reforms (ITU 1989; Melody 1997a; Njuguna 2006; Pisciotta 1997), Tanzania adopted telecommunication sector reform policies in 1993 (URT 1993). The major purpose of telecommunication liberalisation and reform in Tanzania, as was the case in other developing countries, was to abolish monopoly provision of the telecommunication services and introduce competition in the telecommunication market. The reforms aimed to make use of private sector investments in development of ICTs infrastructure, to ensure that these services are widely available to all, including those living in remote rural areas.

The commencement of telecommunication sector reform in 1993 was marked by the dissolution of the Tanzania Posts and Telecommunication Corporation (TP and TC), to be replaced by three entities. These were the Tanzania Telecommunication Company Limited (TTCL), Tanzania Posts Corporation (TPC) and Tanzania Communication Commission (TCC). TTCL operated the telecommunications services, TPC operated the postal services and TCC regulated both postal and telecommunication services. In the same year the Tanzania Broadcasting Commission (TBC) was established to regulate and supervise broadcasting services (URT 1993). These dissolutions marked the end of the monopoly of the incumbent telecommunication operators in Tanzania TTCL. Competition was introduced to the Tanzanian telecommunication market by licensing new operators.

In November 1993 Tanzania licenced the first private company to offer mobile cellular telephone services. In the following years telecommunication services in Tanzania improved following licensing of more operators and the introduction of competition in the telecommunication market (Nnafie 2002). In 2003 the government of the United Republic of Tanzania decided to merge the two regulatory authorities, that is the Tanzania Broadcasting Commission TBC and the Tanzania Communication Commission (TCC), to form a unified regulatory authority called the Tanzania Communication Regulatory Authority (TCRA). The TCRA Act was passed by the parliament in 2003, establishing a single regulator for the telecommunications and broadcasting sectors (URT 2003b).

This decision to merge the two regulatory authorities was driven by convergence of technologies, international experience and industrial dynamism. The decision was also fostered by the fact that some of the activities of the two bodies overlapped. Tanzania had its first National ICT Policy in March 2003 (URT 2003a).

2.3.1 Status of ICT services in Tanzania

According to (TCRA 2007a), by March 2007 the status of ICT services in Tanzania was:

2.3.1.1 Telephone

About 6.3 millions Tanzanians owned voice telephone lines. The mobile voice telecommunication leads the market by having more subscribers (6.2 millions), compared to fixed-line services (0.14 million). The market share of different telephone operators in Tanzania shows that Vodacom is leading the market in terms of number of subscribers, with about half (51%) of all voice telephone subscribers in the country. Celtel ranks second, with 26% of subscribers, followed by Tigo (13%), Zantel (7%) and TTCL- Fixed (3%).

2.3.1.2 Fixed telephony

The Tanzanian incumbent fixed-line operator, Tanzania Telecommunication Company Limited (TTCL), was partially privatised in 2001 (Mwandosya 2001, TCRA 2005). This was followed by the extension of its monopoly for a further four years, through what was termed the exclusivity period[6].

TTCL exclusivity ended in February 2005 (TCRA 2005). The Tanzanian fixed telephone market is currently fully liberalised and has two operators, TTCL and ZANTEL. The introduction of competition in the fixed-lines telephones is expected to increase quality and lower the price of this service.

The network infrastructure for fixed telephones is at present, limited to urban areas. Lack of telecommunication infrastructure in rural areas remains a basic impediment to the provision of ICT services, such as the internet, in rural areas of Tanzania (Nnafie 2002; URT 2003a).

2.3.1.3 Mobile telephone

The mobile telecommunication market in Tanzania is fully liberalised. There are four licenced land cellular mobile telephone companies in Tanzania. These are Vodacom, MIC Tanzania Ltd

[6]Following the global trend in telecommunication sector reform, developing countries have been privatizing their state-owned telecommunication firms. The newly-privatized firms were given an 'exclusivity period', whereby the government allowed these firms to operate as a monopoly for some years. The exclusivity period was typically granted to increase the sale price of the firm and thus government revenues, at the cost of delaying competition in the sector, which also delays improvements in telecommunication services to the population (Wallsten 2000).

(formally operating as Mobitel and now as Tigo), Zantel and Celtel. The success story of Tanzanian connectivity is on the mobile telephones. It was first introduced in 1994 and has enjoyed strong growth since 1999. The growth in the mobile market picked up with the market entry of Vodacom in 2000 and the introduction of prepaid services. Mobile telecoms operators have considerably extended their network coverage in the past few years. The operators are constantly rolling out their network to cover even the smaller towns and the market is highly contested. Despite the fierce competition in the mobile market, the current tariffs are still too high for the majority of the population to afford (Esselaar, Stavrou and O'Riordan 2004).

A report from Intelcom Research and Consultancy (2002) indicated that, in the case of Tanzania, the growth of the cellular phone industry has been phenomenal. Today, and increasingly in the future, cellular is to be the most significant entry point to the information society for Tanzanians. The report explains that cellular networks now cover an estimated 50 percent of the total population, including 33 percent of rural Tanzanians. Other authors, such as BBC (2005), Burrows (2003), Cronin (2004), Grant (2004), Hamilton (2003), Hancock (2005) and Ross (2004), reported the tremendous growth of the mobile phone industry, not only in Tanzania but throughout Africa.

In of despite these tremendous improvements, most rural areas of Tanzania are still not covered. In most rural areas the majority of the people still cannot afford the services, mainly due to high initial costs of the mobile phones and, in most cases, the network is patchy or not available.

2.3.1.4 Internet, data services, broadcasting and other services

The Tanzanian ICT market has a number of other operators, including public data communication companies, public internet service providers (ISPs) and broadcasters for television and radio. The Tanzania regulator has introduced a new convergence licensing regime, aimed at the implementation of a full liberalisation policy, following the expiring of exclusivity rights given to incumbent telecommunication operators, Tanzania Telecommunications Company Limited (TTCL), in February 2005 (Mireny 2006; TCRA 2005; ITU 2005a). Whereas in the past, operators were given a licence for each of the services they are providing, under the new licensing regime licensees are authorised to provide different services under a single licence.

The introduction of the converged licensing framework is considered a key strategy for addressing the technological, market and service convergence. According to TCRA (2007b), the essence of this new regime lies in the convergence of fixed and mobile, voice and data, data and content and IT and telecommunications. The new licensing regime is expected to ensure efficient utilisation of facilities and network resources for a broader range of ICT services, encourage market entry by a full range of operators, including large-scale and micro-entrepreneurs, and encourage infrastructure development and hence provide Tanzanians with a choice of high-quality and affordable services (TCRA 2005). The converged licensing framework has four categories of licences which include a network facility licence, a network service licence, an application service licence and a content service licence.

2.3.1.4.1 Network facility licence (NFL)

This licence authorises ownership and control of electronic communication infrastructure including earth stations, fixed links and cables, public payphone facilities, radio communications transmitters and links, satellite hubs, satellite control station, space station, submarine cable landing centre, switching centre, towers, poles, ducts and pits used in conjunction with other network facilities (Mfungahema 2006; TCRA 2007b; Ulanga 2005). Up to the end of 2006, TCRA had licenced five network facility companies. Four of them operate both national and international network facilities and one operates a national network facility (TCRA 2007c).

2.3.1.4.2 Network service licence (NSL)

This licence authorises the operator to establish electronic communication networks and deliver services. This category includes bandwidth services, broadcasting distribution services, cellular mobile services, access applications service and space segment services (Mfungahema 2006; TCRA 2007b; Ulanga 2005). Up to the end of 2006 TCRA had licenced five network service companies. Four of them operate both national and international network services and one operates a national network service (TCRA 2007c).

2.3.1.4.3 Application service licence (ASL)

This licence authorises the reselling or procurement of services from network service operators. The salient feature of this licence is that the licensee does not own network infrastructure, nor operate the network. Examples are internet providers, virtual mobile providers, payphone services, public cellular services, IP telephony, public payphone service and public switched data service (Mfungahema 2006; TCRA 2007b; Ulanga 2005). Up to the end of 2006, TCRA had licenced twenty-four application service companies. One of them operates at international level, seven operate at national and international level, sixteen operate at national level and one operates at regional level (TCRA 2007c).

2.3.1.4.4 Content service licence (CSL)

This licence authorises the provision of content such as satellite broadcasting, terrestrial television broadcasting, terrestrial radio broadcasting and other electronic media (Mfungahema 2006; TCRA 2007b; Ulanga 2005). Up to June 2006, TCRA had given content service licences to thirty-seven national, regional and district (community) radio stations. Twenty-one television stations were also licenced (TCRA 2007b).

2.3.2 Tanzania ICT policy/e-strategy

The term ICT policy is sometimes used interchangeably with the term e-strategy, which mainly refers to policies and strategies intended to exploit information and communication technologies to promote national development (Wild 2003). In recent years developing countries have been called upon to develop ICT policies following the advancement in ICT and the realisation of the potential role that these technologies can play in achieving development goals, including the Millennium Development Goals (MDGs) (AISI 2003; DOT force 2001). The major purpose of ICT policies is to raise the awareness of policy-makers and the public on the importance of ICTs as an enabling tool for development. Such policies normally cover various aspects in the ICT sector, including infrastructure development, ICT applications and content development (Adam 2005).

Tanzania adopted its national ICT policy in 2003 (URT 2003a). The adoption of this policy shows the willingness of the Tanzanian government to pursue ICT development to achieve

national development goals. The overall policy mission of the Tanzania ICT policy is to enhance national economic growth and social progress through ICTs in all sectors (URT 2003a). To achieve this objective, the government wants to create an investment environment conducive to capacity building and encouraging multi-layered co-operation, locally and globally.

The policy outlines ten broad priority areas that need to be dealt with, to achieve the overall mission of the policy (URT 2003a). A few steps have been taken by the Tanzanian government to address some of the priority areas mentioned in the ICT policy. However, the overall implementation of the policy is still waiting for the implementation strategy document of the policy to be completed. The implementation strategy document for the Tanzania ICT policy is in the draft phase. The ten priority areas are discussed below.

2.3.2.1 Strategic ICT leadership

The government of Tanzania recognises the importance of leadership and governance structures to guide the ownership and development of domestic ICTs. To achieve these goals, the government is committed to increasing the use of ICTs for development of socio-economic and cultural purposes. The government also created a national governing body to co-ordinate ICT policy and implementation. The government is striving to create an appropriate investment climate for public-private partnerships.

2.3.2.2 ICT infrastructure

The government desire for ICT development is dependent on infrastructural development. The government intends to ensure a reliable, nation-wide, state-of-the-art ICT infrastructure by supporting incentives, directives and institutions that expand ICTs. To ensure adequate ICT infrastructure development in the country, Tanzania is a member of the on-going project to connect the eastern side of the African continent to the international fibre optic network.
This project, commonly known as the East African Submarine Cable System (EASSy), is set to run from Durban in South Africa to Port Sudan in Sudan (APC 2007; CIPESA 2006; Mikenga 2006). EASSy is expected to lower costs of internet connectivity because it will enable operators to route their traffic via submarine cables, rather than via satellite

connections, which are much more expensive. Hence, if operators switch to the submarine cable they will ideally be able to charge lower end-user prices (CIPESA 2006).

2.3.2.3 ICT industry

The government intends to create a conducive business climate for investment and development by building direct relationships with ICT manufacturers and designers. These relationships will ease restrictions on trade and development and provide advice to the government on issues related to ICT development.

2.3.2.4 Human capital

The development of human capital is recognised as integral to the success of ICT and national development. Consequently, the government has committed to increasing and promoting education in ICT as a means of building a sustainable ICT transformation. Government intends to encourage and support ICT use throughout all education sectors, boost qualified ICT professionals and provide incentives for advancing ICT capacity.

2.3.2.5 Institutional arrangements, legal and regulatory framework

The government recognises that, prior to ICT development occurring, a suitable legal and regulatory framework must be established. The government intends to establish an enabling legal framework that is aligned with the constitution, legislative and regulatory environment and regional and international standards.

2.3.2.6 Productive sectors

These include manufacturing, agriculture and mining. Tanzania's economy is dependent on the producing sectors. The government is dedicated to meeting the needs and requirements of industry. The government's desire to expand the economic impact of ICT in development will involve fostering enterprise and innovation, through an appropriate economic environment.

2.3.2.7 Service sectors

The service sectors incorporate several industries and human resources sectors. The government specifically intends to highlight the cross-cutting nature of these sectors and

ICTs. The government intends to establish a conducive environment for secure e-commerce transactions; encourage ICT in financial services; enhance efficiency and continuity; develop and provide a national e-health system; and encourage e-tourism and internet cafés.

2.3.2.8 Public services

The facilitation of e-government services is essential to the efficient and effective dissemination and protection of data and service delivery throughout the nation. The government intends to lead by example by illustrating to both the public and the private sector the utility and benefits of ICT and digital services.

2.3.2.9 Local content

The government recognises the importance of balancing the importation of foreign influences with the creation and protection of local cultural values. To achieve this balance, the government intends to support the creation and development of ICT materials, encourage local content development, promote the inclusion of schools in local multi-media development and promote local content for electronic activities/services.

2.3.2.10 Universal access

The government wants to ensure universal access for all sectors of society. Of concern is the digital divide between access in urban and rural areas and national and international relations. The government intends to promote literacy, while building universal access, promote and provide ICT to increase productivity and opportunities, develop peer-to-peer grassroots information sharing and create private-public partnerships to enhance access to services.

To sum up the discussion on the Tanzanian national ICT policy, the present researcher concludes by saying that, in spite of the good intentions and strategies outlines in the policy, policy-making is just a small part of the equation, especially in the fast-moving global ICT environment. Many African countries, including Tanzania, are facing challenges with regard to their e-strategies. Adam (2005) explains that, although the number of countries aiming to benefit from ICTs by developing their e-strategies is increasing and some of the ICT policies were useful in mobilising resources and attracting collaborators, the result of broad-based ICT policy implementation has been inadequate.

A review of the ICTs policy formulation process in Africa shows that it has been difficult to develop and implement policies and programmes that bring quick returns for the society and therefore the formulation and implementation of e-strategies has been sluggish in Africa (Adam 2005, Njuguna 2006; Wild 2003;). According to the Economic Commission for Africa (ECA 2003), while more than half of the countries in Africa have developed an ICT policy, only a few countries have embarked on policy implementation activities, with the rest of the countries still deliberating or said to be planning how to move ahead with policy implementation. Due to these challenges, the impact of e-strategies or ICT policies on development and poverty reduction, using ICTs, has been minimal compared to the energy, resources and time spent on them so far (Adam 2005).

2.4 Universal access policies in Tanzania

Universal access is an important component of the Tanzanian national ICT policy. The concept has a crucial significance to this study. These policies are sometimes termed universal services[7] policies or universal access[8] policies or, at times, a unified term of universality[9] policies is used (Intven and Tetrault 2002).

Many countries have set different universality goals and therefore the term accessible means different things to different countries and regions and different things in different contexts within each country (ITU 2004a). Developing a definition for universality in a country is very important, as it can be a mechanism for agreeing national targets with the many stakeholders involved, which must then be monitored to ensure compliance.

In the case of Tanzania the government has committed itself to the development of telecommunication services, by placing the telephone within 'easy reach' of every body (URT 1997a). In addition, the government has set a rural teledensity target of one telephone line per

[7] Universal service refers to the policy of providing ICT services to individual subscribers, usually measured by household penetration. In developed countries, a figure of 90% of households with a phone is normally considered to mean that full universal service has been achieved. Universal service is a practical policy objective in many industrialized countries (Benjamin and Dahms 1999).

[8]Universal access refers to the policy of ensuring that members of the community are able to use ICTs often, via public provision, through public phones and telecentres. It is a goal adopted by many developing countries to provide convenient and affordable access to communications (Intven and Tetrault 2002).

[9] Universality is the term that refers to both universal access and universal services.

village by 2020 and the overall teledensity of six by the year 2020 (URT 1997a). This will be achieved mainly by setting up a rural telecommunication development fund. After many years of waiting, the ministry responsible for ICTs in Tanzania (the then MoID)[10] finally devised a strategy for implementing universal access. The Tanzanian Universal Access Act was approved by parliament in February 2007 (URT 2007). The final structure and mechanism for universal access in Tanzania comes almost fifteen years since the Tanzania government adopted telecommunication sector reform in 1993 (Esselaar, Stavrou and O'Riordan 2004; Mureithi 2002; Souter *et al.*, 2005).

Concerns about the delayed implementation of universal access in Tanzania have further been expressed by different authors. Muriethi (2002) reported that, in Tanzania, competition and liberalisation of the telecommunication sector had shifted the focus of operators to the profitable urban areas, at the expense of the rural areas, despite the chief aim of the policy being the need to improve access in rural areas. Intelecon Research and Consultancy Ltd (2002) had reported that it was almost eight years since the government of Tanzania launched telecommunication sector reforms in 1993. The process and final structure of the sector, especially regarding rural service provision, was still uncertain.

2.4.1 Universal access fund

Telecommunications services are increasingly considered by governments around the world as a basic necessity of citizens, essential to full participation in the 'new information economy'. In the past, monopoly operators had to absorb the costs of meeting the country's universal access objectives. These operators had to finance the delivery of essential telephone services to uneconomic regions, mainly through cross subsidies, which flowed from profitable market segments such as international, long-distance, business users and urban users, to less profitable market segments such domestic, local, residential users and rural usage (Intelecon research and consultancy 2004).

While cross-subsidies served their purpose in monopoly environments, they create problems in newly competitive environments. In particular, cross-subsidies have been known to distort

[10]Currently, the ministry responsible for ICTs in Tanzania is called the Ministry of Communications, Science and Technology.

market signals and place an unfair burden on certain operators. To finance their access objectives in a competitively neutral and transparent manner, an increasing number of countries are turning to universal access funds (Intelecon research and consultancy 2004).

A universal access fund is an account, usually managed by the telecom regulatory agency, from which universality demands are financed directly. It can be referred to as a universality access funds, universal service fund, or a telecommunications development fund (Lewis 2004). Universal access funds receive finances from various sources and provide targeted subsidies to encourage the provision of telecommunication services by private operators in otherwise uneconomic regions (Intelecon research and consultancy 2004).

The Tanzanian Universal Access Act of 2007 stipulates the establishment of a universal access fund, which will be called the Universal Communications Service Access Fund (UCSAF) (URT 2007). The major purpose of the UCSAF is to reduce the ICT access gap between the rural and the urban areas by offering special incentives to investors in rural ICT provisions, supporting the construction of rural telecentres and involving local government authorities in ICT utilisation and promotion (URT 2007). The universal access funds can be distinguished on the basis of three key features indicated by Intelecon research and consultancy (2004) and Intven and Tetrault (2002). These include:

2.4.1.1 Sources for funding

Depending on the country and its particular situation, the sources of funding for the universal access funds have included national budgets of governments, charges on interconnecting services, levies on subscribers and levies on operator revenues. Funding from international development agencies is also an option. The Tanzanian universal service fund will be supported by a universal service levy imposed on all holders of communication licences. Other sources of the fund for the UCSAF will be money from the government and grants and donations from individual and legal entities (URT 2007).

2.4.1.2 Fund management

Universal access funds can differ in their management. While some funds are administered by government ministries, as in the case of Colombia, other funds are administered by the

regulators, for example in Peru and Chile, or special agencies such as in South Africa. In the case of Tanzania the fund will be managed by a special agency, which will be supervised jointly by the ministry responsible for communication in Tanzania (the then MoID and currently Ministry of Communications, Science and Technology) and the regulatory agency TCRA (URT 2007).

2.4.1.3 Type of services covered by the fund

Universal access funds can be distinguished by the type of services they support. Developing countries' funds, in the past, have placed greater emphasis on ensuring basic public access such as basic telecommunications services. However, with the growing importance of the internet to national economies, many of today's newer funds also support public access to value-added services, including internet access (Lewis 2004). The Tanzanian universal service fund will cover a variety of services, including basic telephone service and telecentres in rural areas (URT 2007).

The Tanzanian universal access fund will serve rural areas and under-served urban communities. The universal service providers will be those persons who already hold communications licences issued by TCRA (URT 2007). Similar funds are operational in other developing countries such as Uganda, Ghana, South Africa, Chile, Brazil, Peru, India and Malaysia (Intelecon research and consultancy 2004). The Tanzanian universal access fund was expected to start operations at the end of the year 2007.

2.5 ICT sector development in rural areas of Tanzania

Tanzania represents many of those aspects that make rural ICT infrastructure development so challenging and demanding. One of such factors is the size of the country, Tanzania covers a total size of 940,000 square kilometres of land area, which is more than the land area covered by its neighbours Kenya and Uganda combined. The country is divided into 26 regions and 129 districts. This makes it very difficult to deploy viable connectivity solutions for countrywide ICT access (Nielinger 2003).

Another exacerbating factor is the high proportion of rural population, which is sparsely distributed. In terms of ICT connectivity, it means establishing access points in many different dispersed locations, only serving a very limited number of people. Rural incomes are very low, at less than one-third of urban incomes, hence the purchasing power is low (Intelcom research and consultancy 2002). Other factors, such as lack of reliable sources of power due to low coverage of the electricity grid and lack of other basic services such as transportation, make rural connectivity difficult. Therefore, due to these factors, urban-rural disparity of the ICT infrastructure is typically high (URT 2003a).

There are some developments towards rural connectivity in terms of coverage of the mobile phones Global System for Mobile Communications (GSM) networks and a few telecentre projects initiated by COSTECH and some donor agencies (COSTECH 2005). However, such projects are very few and small-scale, compared to the needs of the entire rural population of Tanzania. The Tanzanian government therefore has a difficult task to address rural ICT access, considering the inability of current policies to enable the private sector to deliver services to the rural areas.

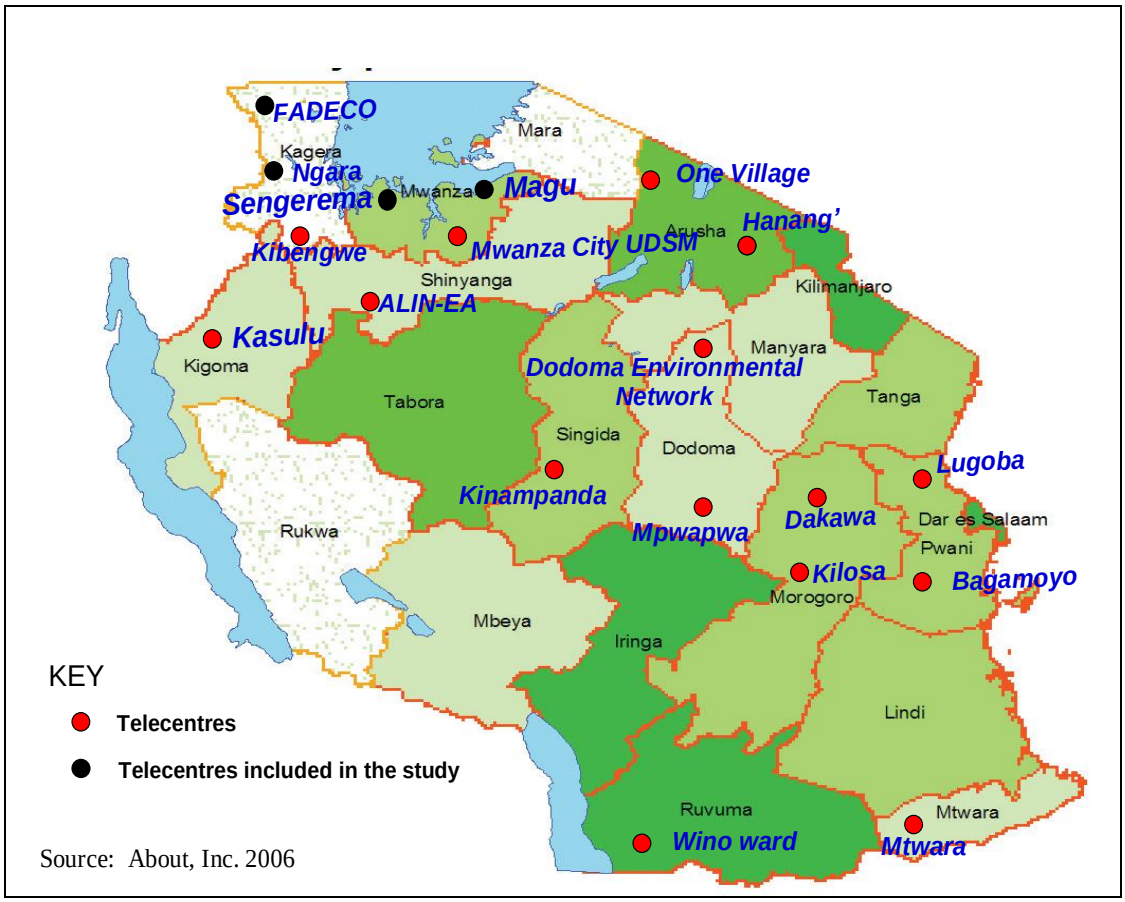
2.6 Telecentres in Tanzania

A telecentre is a public facility in the community that affords people the opportunity to use ICTs. (refer to section 1.7.7 in Chapter One). Sengerema Multipurpose Community Telecentre was the first telecentre to be established in Tanzania, under the ITU, IDRC and UNESCO framework (ITU 1998). The telecentre is located at Sengerema district, Mwanza, Tanzania. The centre commenced its operations in 2000 and it offers a range of ICT services, including computer training for the community. Currently there are more than ten telecentres operating in Tanzania. The objective of these telecentres is to bring affordable computer-based telecommunication services to rural and semi-urban communities (Massawe 2004). These telecentres are Sengerema Multipurpose Community Telecentre in Mwanza, Magu (Crop and Marketing Bureau (CROMABU)) Telecentre in Mwanza, Mwanza City/University of Dar es Salaam Community Telecentre, Ngara Rural Telecentre, Kasulu Telecentre in Kigoma, Bagamoyo and Lugoba Telecentres in Coastal region, Hanang Telecentre in Arusha, Dakawa and Kilosa Telecentres in Morogoro, Family Alliance for Development Co-operation

(FADECO) Telecentre in Karagwe, Bukoba region and Wino ward Telecentre in Mbinga, Ruvuma region (COSTECH 2005; FADECO 2005; Chanzi 2002).

Other, more recently established telecentres include: Dodoma Environmental Network in Dodoma region, Multipurpose Telecentre in Mpwapwa-Dodoma region, Kinampanda Multipurpose Telecentre in Iramba district-Singida region, Kibengwe Rural Communication Access and Development Centre in Bukoba rural district, OneVillage Rural Community Telecentre in Arumeru district in Arusha region, Arid Lands Information Network (ALIN-EA) in Shinyanga district, Shinyanga region, and Mtwara Telecentre in Mtwara region (COSTECH 2005; UgaBYTES Initiative 2006). (Refer to Figure 2.1).

Figure 2.1: Map of Tanzania showing the location of telecentres



There are also a number of e-development projects, such as the First Mile Project, which is funded by the International Fund for Agricultural Development (IFAD) (IFAD 2005). This project is operating in the northern part of Tanzania. In urban areas of Tanzania there are internet cafés which are privately owned and many Tanzanians in urban areas access the internet through these internet cafés (Esselaar 2001; Chachage 2001; Ndume 2004).

2.7 Rationale for choosing the specific areas of study

This study is based in selected rural areas of Tanzania and there is thus a need to define what rural areas are and differentiate them from urban areas. By definition, and in the Tanzanian political and administrative context, all regional and district headquarters are defined as urban areas. Other areas are categorised as urban, provided there is a concentration of houses and there are institutions such as police stations, post offices, health centres and streets (Ngalinda and Mutagahywa 2005).

All the four locations where this study is based (Ngara, Karagwe, Magu and Sengerema) are district headquarters. Although these areas do not fall directly under the Tanzanian political and administrative definition of rural areas, in terms of ICT infrastructure development all these areas are considered rural and they comply with the ITU (2000) definition of rural and remote areas. According to ITU (2000), a rural area is characterised by absence of public facilities such as reliable electricity supply and regular transport, scarcity of technical personnel, a low level of economic activity, mainly based on agriculture, fishing or handicrafts, low per capita income and underdeveloped social infrastructures such as health and education. These characteristics are common in all the four selected study areas.

All these areas comply with the main challenges of bringing sustainable ICT solutions to remote areas poorly served with basic infrastructure such as transport, electricity and communication. The term ‘rural’, as used in this study, is more associated with remote and disadvantaged regions rather than with the size of the town. According to Nielinger (2003), district headquarters reflect the *status quo* of Tanzanian upcountry ICT deployment that had started from the centre in Dar es Salaam. It subsequently included major regional towns and is now about to target the district level, which is the focal point of this research.

A report from COSTECH, a government research agency which is actively involved with telecentre projects in Tanzania, indicates that the plan that COSTECH has at the moment is to introduce more telecentres to cover all the districts in Tanzania and to make district headquarters the base for ICT development in rural areas of Tanzania (Mlaki 2005).

The choice of the four districts, of Ngara, Karagwe, Magu and Sengerema, as areas of study, is facilitated by the presence of telecentres and a number of other factors such as geographical location and economic activities taking place in these areas. The following sections present a description of each district where this study was conducted. Further descriptions are provided in section 4.6 with regard to services offered by the telecentre located in each districts.

2.7.1 Sengerema

Sengerema is one of the seven districts in Mwanza region. Other districts include Magu, Kwimba, Misungwi, Geita, Ukerewe and Mwanza (URT 1997b). Sengerema district covers a land area of 3,335 square kilometres and is divided into five division, 25 wards and 124 villages (URT 1997b). According to the 2002 Tanzania national census, the population of Sengerema district was 501,915 (URT 2002b).

In terms of climate, Sengerema district enjoys fairy reliable rainfall, with two rainy seasons, which makes farming feasible. Major economic activities in the district are farming (peasant/small-scale), livestock-keeping and fishing (URT 1997b). However, other economic activities such as mining and small-scale industries are also carried out. Major food crops grown in Sengerema are maize, cassava, paddy/rice and bananas, while major cash crops are cotton, bananas and horticultural crops. Sengerema district is endowed with wealth in terms of soil fertility, products from Lake Victoria, forests, livestock and human labour (URT 1997b). National statistics locate this district among the important ones and indicate it as one of the great resource treasures in the nation (Twakikyondo 2002). However, as is the case with many rural areas of Tanzania, where the majority of the people depend on small-scale agricultural production, poverty levels in Sengerema are high and most of the resources in the district are under-utilised.

2.7.2 Ngara

Ngara is one of the five districts in Kagera region. Other districts include Biharamulo, Karagwe, Muleba and Bukoba. Ngara is in the extreme north-west of Tanzania. It borders on Rwanda in the North, Burundi in the south-west, Biharamulo in the east, Karagwe in the north-east and Kibondo in the south. Ngara district covers an area of 3,744 square kilometres and it is divided into four divisions, 17 wards and 72 villages. It is further subdivided into 359 sub-villages. According to the 2002 census Ngara had 49,082 households, with a total population of 334,409 people, including refugees. Tanzanians numbered 233,409 and the rest were refugees (URT 2007).

The economy of Ngara depends mainly on small-scale farming. The majority of the households earn their living from small-scale subsistence farming. Agricultural production is basically for local consumption and the district domestic market. Coffee is the only well-established cash crop, followed by recently-introduced tobacco and cotton production. Coffee is not produced in large quantities in Ngara when compared with the neighbouring districts of Karagwe and Muleba, despite the fact that Ngara has favourable climatic conditions for the production of coffee and other crops (URT 2007).

The district has two rainy seasons, with annual rainfall of from 800 mm to 1,400 mm. The basic food crops in Ngara district are bananas, beans, maize, cassava and sweet potatoes (URT 2007).

2.7.3 Karagwe

Karagwe district is one of the five districts of Kagera region. Other districts include Ngara, Biharamulo, Muleba and Bukoba. Karagwe district covers an area of 7,716 square kilometres. The district is located in the north-western corner of Tanzania. It borders Uganda in the north and Rwanda in the west (URT 2006c). Administratively, Karagwe district consists of four divisions. The divisions are divided into 28 Wards and 117 registered villages. Based on the 2002 population census, the total population of Karagwe district is estimated to be about 424,287 (URT 2002b). The average income of the people in Karagwe is only two-third of the national average, which shows the relative poverty of the district. Large income inequalities

within the district are evident, with an estimated 40% of the total population living in absolute poverty.

The district has a tropical climate and the rainfall distribution is bimodal, with peak rains falling between September to December and March to May. Land in the district is mainly used for farming, and to a lesser extent, for livestock-keeping (URT 2006c). The main economic activity in the district is agriculture. The economy is dominated by subsistence small-holders, who grow bananas and beans for local consumption and for the domestic market. Coffee (Robusta), bananas and beans are the main cash crops. Livestock-keeping is the second most important activity in the district. Industrialisation has hardly occurred due to the relative isolation of Karagwe and Kagera, limitations on cross-border trade (legal, security), poor transport and communication networks and little electrification (URT 2006c).

2.7.4 Magu

Magu is one of the seven districts in Mwanza region. It is located in the north-western part of Tanzania, bordering Lake Victoria (URT 1997b). Magu district covers a land area of 3070 square kilometres and is divided into six divisions, 27 wards and 116 villages (URT 1997b). According to the 2002 Tanzania national census, the population of Magu district was 415,005 (URT 2002b). Magu district has a tropical, dry climate, which gets very hot towards the end of the dry season. The district has two well-defined seasons, the dry season and the rainy season. Rainfall tends to be scanty, patchy and generally unreliable. Low and unreliable rainfall causes frequent crop failures, especially in maize production (URT 1997b).

Magu district is one of the poorest districts in Tanzania and the district had been experiencing persistent, unfavourable weather conditions. Since the major sources of livelihood in the district are farming and animal husbandry (accounting for over 90 percent), livelihood insecurity increased due to bad weather (URT 1997b). Another production problem in the district is declining soil fertility, due to factors such as overgrazing, poor farming methods and population growth (Kamuzora 2003). These problems have collectively resulted in further marginalising the livelihoods of residents through declining food and cash crop production. Poor management of co-operatives is another problem, which aggravated problems in

agricultural production, particularly in accessing appropriate agricultural inputs and marketing of agricultural produce (Kamuzora 2003; URT 1997b). Efforts to promote income generation activities and other diversified coping strategies were believed to have been undermined by inadequate access to credit, along with inadequate business entrepreneurial skills among the target population, particularly the women in the Magu district (Kamuzora 2003).

2.8 Summary

The chapter provided a brief summary of Tanzania and its environment. It presented the status of the ICT sector development in Tanzania and gave a brief overview of the ICT sector development in the country, as a whole, and in rural areas of Tanzania. The chapter explored the status of rural development in Tanzania and described the poverty reduction strategies and policies which the country has adopted thus far. A brief discussion on the successes and challenges of these strategies was provided.

The chapter went on to discuss telecommunication sector reforms, universal access policies and fund and challenges to implement the policy. It gave a brief account of ICT sector development in rural areas of Tanzania, dwelling on the size of the country, the predominance of the rural population, low income rates, lack of power supply to explain the rural-urban disparity of the ICT infrastructure. Briefly, the chapter touched on developments in terms of mobile communication. The chapter also briefly described the different telecentres in the country. The study areas are also discussed in the chapter.

CHAPTER THREE

LITERATURE REVIEW

3.0 Introduction

This chapter discusses the literature on information and communication technologies, socio-economic development and sustainable livelihoods. Building upon previous studies this chapter begins by addressing the purposes for which the literature was used in the current study and shows how the literature review for this study is organised. The chapter presents the theoretical foundation of the study and shows the debates, scepticism and controversy currently found in discussions of the role of ICTs for sustainable livelihoods and socio-economic development in developing countries.

The reasons for conducting the literature review for this study was to position the study within other similar studies and explore the available knowledge in the study area, so as to understand the relationship between the problem and the body of knowledge in the area. Other reasons were to establish the need for this kind of research and acquaint the researcher with the methodologies that have been used by others to find answers to research questions similar to the ones investigated in this study.

3.1 Definitions, purpose and organisation of the literature review

The literature review is a systematic, explicit and reproducible method for identifying, evaluating and interpreting the existing body of recorded work produced by researchers, scholars and practitioners (Blaxter, Hughes and Tight 2001: 120). It is a critical discussion of all significant, publicly available literature that contributes to the understanding of a subject (Pickard 2007: 26). The literature review involves the systematic identification, location and analysis of documents containing information related to the research problem being investigated (Mugenda and Mugenda 2003: 29). A review of the literature is important because it enables the researcher to acquire an understanding of the topic, identify related research and place the work in the context of what has already been done (Trochim 2001: 27). The main purpose of the literature review is to determine what has already been done in relation to the research problems being studied. Mugenda and Mugenda (2003: 29) pointed

out that this knowledge helps the researcher avoid unnecessary and unintentional duplication and demonstrates researcher's familiarity with the existing body of knowledge on the subject.

Various scholars have highlighted the benefits of conducting a literature review (Creswell 2003: 27-28; Kothari 2004; Mugenda and Mugenda 2003: 29; Pickard 2007: 26). According to Fraenkel and Wallen (1990) cited by Creswell (1994: 20) the literature review shares with the reader the results of other studies that are closely related to the study being reported. It relates the study to the larger, ongoing dialogue in the literature about a topic, filling in gaps and extending prior studies. It establishes the importance of the study as well as providing a benchmark for comparing the results of a study with other findings. Other purposes of the literature review, pointed out by Kumar (1999: 26), are bringing clarity and focus to the research problem, improving the methodology and broadening the knowledge base in the research areas.

The literature review plays an extremely important role in shaping the research problem, because in the course of reviewing the literature the researcher understands the subject area better and this helps the researcher to conceptualise the research problem clearly and precisely. Knowledge of the literature is defined by Strauss and Corbin (1990: 41) as one source of gaining "theoretical sensitivity". These authors define theoretical sensitivity as "a personal quality of the researcher", indicating "an awareness of the subtleties of the meaning of data"

Characteristics of a good literature review, as pointed out by Peters (1994: 29), include the literature review being exhaustive, but not necessarily bulky, representative, directly related to the research problem, being critical and analytical and not resorting to castigating other scholars if they fell short of a researcher's expectations. Stilwell (2000: 173) stressed that a good literature review needs to indicate the different views, agreements, disagreement and trends of thought on the topic of research. It should be accurately portrayed and acknowledged in the text and produce a conceptual model, including philosophical stances and theoretical assumptions and key assumptions and theoretical problems or contradictions.

The literature review might take several different forms and little consensus exists about the preferred form (Creswell 2003: 32). Various scholars have provided a guideline to the form the literature review may take. Kaniki (2000: 17) indicated that the literature review can present a historical review, which considered the chronological development of the literature. Another style is to break the literature into stages or phases and thematic reviews which are structured around different themes or perspectives and often focused on debates between different schools and theoretical reviews which trace the theoretical development in a particular area. The last style is to use empirical reviews, when an attempt is made to summarise the empirical findings on different methodologies.

Cooper (1984 cited by Creswell 2003: 32) suggested that the literature review can take three different forms. The first one is integrative, in which the researcher summarises broad themes in the literature. A second form is theoretical review, in which the researcher focuses on extant theory that relates to the problem under study. The third form suggested by Cooper (1984) is methodological review, in which the researcher focuses on methods and definition. Pickard (2007: 34) believed that the literature review not only informs the researcher of the "state of knowledge" of the subject, but it also provides insight concerning methodology. In methodological review the researcher not only provides a summary of the study but also provides an actual critique of the strength and weaknesses of the methods section.

The present study adopted a combination of the chronological, thematic and methodological approaches to presenting the literature related to the study. Therefore, for the purpose of this study:

- The literature review chapter discusses the different models that explain the relationship between ICTs and socio-economic development.
- Literature related to this study was reviewed thematically, by organising the available literature into sections that focus on themes that relate to the study. These include the main themes derived from the objectives and research questions of the study.
- The literature review presented a chronological review of the origin and the way in which knowledge has been built up in the field of ICTs for socio-economic

development and identified important trends, the available debates and controversies in the field.

- The review included empirical research that is closely related to the study. These included articles from peer reviewed scholarly journals, research reports from national and international organisations and individuals, theses and dissertations. Government publications, statutes and policy documents which were relevant to the study were included in the literature review.

3.2 Theoretical framework of the study

This section provides background information on theories and models and their use in qualitative and quantitative research. The section will also present the theoretical framework and models which guided this study. Anfara and Mertz (2006: xxvii) defined theoretical frameworks as any empirical or quasi-empirical theory of social and /or psychological process at a variety of levels (e.g. grand, mid-range and explanatory) that can be applied as a 'lens' to the understanding of the phenomenon.

A theory is defined as a set of interrelated concepts, definitions and propositions that present a systematic view of a phenomenon, by specifying relationships among variables with the purpose of explaining and predicting the phenomenon (Kerlinger 1970: 64). Theory gathers together all the isolated bits of empirical data into a coherent conceptual framework of wider applicability (Cohen, Manion and Morrison 2000: 11). A theory concerns what is known about the social world of the research (Gorard and Taylor 2004: 164). Mouly (1978: 18) explained that a theory constitutes an attempt to make sense out of what we know concerning a given phenomenon. Creswell (2003: 139) stated that a theory explains how and why variables are related, thus acting as bridge between or among the variables.

A theory plays a number of roles in research. It can help to decide what and how the research would be conducted. It also helps researchers to measure and explain issues. It can be crucial in transferring findings to new settings and an important end-product of research findings (Gorard and Taylor 2004: 163). These authors explained that theory and research are

inseparable complements, since research tests ideas stemming from a theoretical model, at times leading to modification of the theory.

Characteristics of a good theory include the theory being compatible with both observations and previously validated theories, stated in simple terms, able to demonstrate precision and universality, having consistency and real assumptions and stimulating further research in areas that need investigation (Cohen, Manion and Morrison 2000: 12; McMillan and Schumacher 2001). A theory should be used as long as it explains or predicts real-world events and should not be used as an end in itself or used to determine the results of the research. Therefore there must be a balance in the use of a theory (Gorard and Taylor 2004: 164).

Theories can be stated in several ways. They can be stated as a series of hypotheses, "if then" logic statements, or visual models characterised by the use of analogies to give a more visual representation of a particular phenomenon (Cohen, Manion and Morrison 2000: 13; Creswell 1994: 83). Actually, theories and models may be treated as one and the same. Kebede (2002: 78) asserted that the concept of theory is broader than the concept of model. In establishing the link between theories and models, Case (2002: 115) pointed out that a model provides a framework for thinking about a problem and may evolve into a statement of the relationship among theoretical propositions.

A model is defined as a simplified representation of a real situation, including the main features of the real situation it represents (Kousoyiannis 1979: 3). Models are representations of the phenomena they model and have the purpose of generating a better understanding of the phenomenon (Kebede 2002: 72). Katz and Harvey (1994: 4) pointed out that the physical world is too complicated to be studied without recourse to models and defined a model as a description of a phenomenon that abstracts from the details that were not directly essential to the understanding of the phenomenon at hand, hence enabling individuals to concentrate on important factors. Accurately formulated models can be of great help in achieving clarity and focusing on key issues in the nature of a phenomenon (Creswell: 2003: 121).

Models are used for different purposes. They can be used to simplify phenomena for the purpose of studying and understanding (Kebede 2002: 79; Meadows and Robinson 1985: 104; Kraft and Boyce 1991: 12). Models can be used for the purpose of advancing and developing theories (Kebede 2002: 78; Mouton and Marais 1993: 104). Models can be used to simplify the essence of phenomena selected for study (Britt 1997: 39; Kebede 2002: 76) and for directing to relevant research questions and areas of investigation (Britt 1997: 5; Miller and Wilson 1984: 73; Mouton and Marais 1993: 139). The later purpose of the use of a model is the one mainly applicable in this study. Kebede (2002: 77) stated that models point out relevant research foci in order to understand or gain new insight into the phenomena of interest. Mouton and Marais (1993: 139) described models as tools that provide questions, pointers and directions for inquiry which might if pursued, lead to a better understanding of the case under investigation.

3.3 Use of theory/models in quantitative and qualitative research

In quantitative studies researchers use theories deductively. Theories are advanced at the beginning of the study with the objective of testing and verifying them, rather than developing them. In this case the researcher advances the theory, collects data to test it and reflects on the confirmation or disconfirmation of the theory presented by the results (Creswell 2003: 120). In quantitative research the hypothesis and research questions are often based on theories that the researcher seeks to test and the theory is used to provide broad explanations and becomes the framework for the entire study, an organising model for the research questions or hypotheses and for the data collection procedure. The deductive approach to research in the quantitative approach has implications for the placement of a theory in the study. Because the theory is used deductively it has to be introduced early in a plan or study. For these reasons, in quantitative research, a theory is normally placed towards the beginning of the plan of study (Creswell 2003: 120-140).

In qualitative research the use of theory is much more varied than in quantitative research. Creswell (2003: 121-140) explained three ways in which theories are used in qualitative research. In qualitative research theory can be used to provide broad explanations that inform the study, as in quantitative inquiry. Ethnographers may employ cultural themes or aspects of

culture that provide series of hypotheses to be tested from the literature and which provides broad explanations that ethnographers use in their inquiries (Wolcott 1999: 113). Theory can be used as a theoretical or an advocacy lens or perspective to guide the researcher to what issues are important to examine, the people that need to be studied and the way the researcher should position him/herself in the qualitative research (Anfara and Mertz 2006: 189). When used this way, a theory helps the researcher frame and shape what the researcher looks at and includes, how the researcher thinks about the study and its conclusion and how the researcher conducts the study (Henstrand 2006: 13). When the theory is used as an advocacy lens or perspective to guide the qualitative researcher, it acts as a sieve (Fowler 2006: 51) and a road map (Kearney and Hyle 2006: 125). In qualitative research, theory can appear as an end-point for a study, as a generated theory (as in grounded theory research), a pattern or a generalisation that emerges inductively from data collection and analysis.

In qualitative research how the theory is used affects its placement in a study. Where the inquirer generates a theory during a study, the theory is normally placed at the end of a project, such as in grounded theory (Creswell 2003: 120; Patton 2002: 125). In other qualitative research it comes at the beginning and what is looked at and the questions asked, such as in advocacy and ethnographic research (Anfara and Mertz 2006: 189; Barbour 2008: 234; Creswell 2003: 120-140; Flinder and Mills 1993: xii). The literature shows that there is little agreement about the role and placement of theory in qualitative research. Such views were also pointed out by Anfara and Mertz **(**2006).

The present research was a mixed methods investigation which utilised both qualitative and quantitative methods, though the most prevalent approach in this study was the qualitative design using case study. Creswell (2003: 136) advised that mixed methods studies may use theory deductively or inductively, based on the emphasis on either quantitative or qualitative approaches in the mixed methods research. Although the most prevalent approach in this study was qualitative, the purpose of the study was not to develop a theory as in grounded theory approaches. Rather the theory was used as an up- front explanation and as a theoretical guide and a perspective to steer the study. This explains the reason why the theoretical

framework for this study was placed at the beginning of the study rather than at the end of the study.

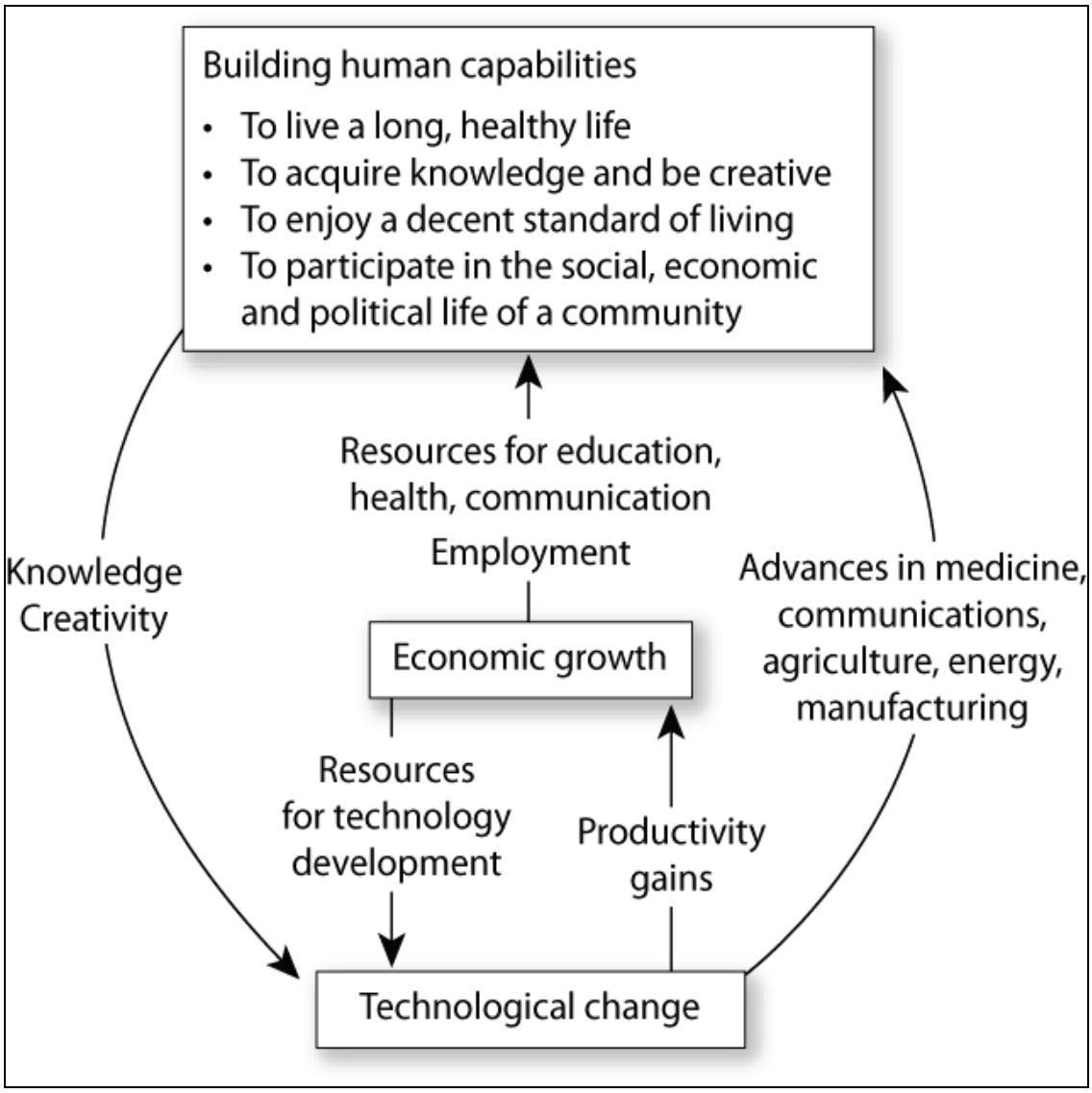
3.4 Models and the theoretical perspective that guided the study

The theoretical foundation of this study was guided by the UNDP model of 2001, which explained how technological innovation such as ICTs relate to human development and the multiple stakeholder model of Washington State University (WSU) (Mitchell and Gill 2002). The theoretical framework draws on Heeks (2005a), who uncovered three other models which explain the relationship between ICTs and socio-economic development. These models comprise the onion-ring, pull and push and the information chain model. The theoretical perspective was informed by the sustainable livelihoods framework, which is an emerging tool that draws on the notion of the multidimensionality of poverty, to improve our understanding of livelihoods of the poor or people living in rural areas (Carney 1998; Chambers and Conway 1992; DFID 2001). The following sub-sections present an analysis of the five ICTs for development models and the sustainable livelihoods framework which guided this study.

3.4.1 United National Development Programme model

According to the UNDP model (see Figure 3.1), ICTs influence human development in two ways. First, it can directly enhance human capabilities. For instance, internet access for information and communication can directly improve people's health, nutrition, knowledge and living standards and increase people's ability to participate more actively in the social, economic and political life of a community (UNDP 2001). A report from the Organisation for Economic Co-operation and Development (OECD) supports this fact that ICTs have great potential in reducing poverty, due to the impact they may have on mainstream development objectives, for instance in health, education and in providing livelihoods and empowerment (OECD 2004). Gillis and Mitchell (2002) explained that ICTs can be framed and applied as a potent tool in reducing poverty, extending health services, expanding educational opportunities and generally improving the quality of life for many of the world's disadvantaged.

Figure 3.1: United Nation Development Programme model



Source: United Nation Development Programme (2001)

UNDP (2001) explained that instantaneous communication and sharing of information capabilities provided by ICTs can raise the crop yields of farmers and provide timely marketing information for agricultural products. Studies in agricultural information in Tanzania show that one of the major constraints for development of the agricultural sector is lack of access to reliable and timely agricultural information by not only farmers, but also extension workers, researchers, policy-makers and other stakeholders (Chailla 2001). ICTs

may be used to facilitate timely access if the information sought is in digital form. Therefore, ICTs can be an effective means to overcome these constraints and provide more accessible, complete, timely and accurate information to various stakeholders in the agricultural sector (Mukhebi 2004**;** Sife, Lwoga and Chilimo 2004). ICTs may provide access to information that can empower people and facilitate growth of small and medium scale enterprises (SME), which can significantly reduce poverty (Duncombe and Heeks 2002 ; Kamuzora 2005; McKemey, Scott and Souter 2003).

The second point with regard to how ICTs can influence human development, as explained by the UNDP model, is the impact on economic growth through the productivity gains that ICTs can generate. ICTs can contribute to economic growth by creating new activities and industries which, in turn, can create new employment opportunities and contribute to national economic growth (UNDP 2001). Lastly, the UNDP model explains that human capabilities and the economic growth which have been prompted by the technological advancement can be re-invested back into ICTs development. Therefore human development and technological advance can be mutually reinforcing, thus creating a virtuous circle.

The UNDP model of 2001 came out as a result of the *Human Development Report* of 2001, which was devoted to looking specifically at how new technologies were going to affect developing countries and poor people. The report explains that the technology divide does not have to follow the income divide, as history has shown that technology is a powerful tool for human development and poverty reduction. Investment in technology may equip people with better tools and make them more productive and prosperous. The report further demonstrates that technology is a tool, not just a reward, for growth and development.

The UNDP model is among the growing volume of literature that perpetuates the role that new technologies, including ICTs, can play in the development process. It is among the many other documents that propagate the hope that ICTs hold for the battle against poverty in the Third World. However, the relationship between ICTs and development and the mechanisms that are being used to bring ICTs to developing countries and to bridge the digital divide have been heavily criticised (Moodley and Cloete 2004; Rodriguez and Wilson 2000). The

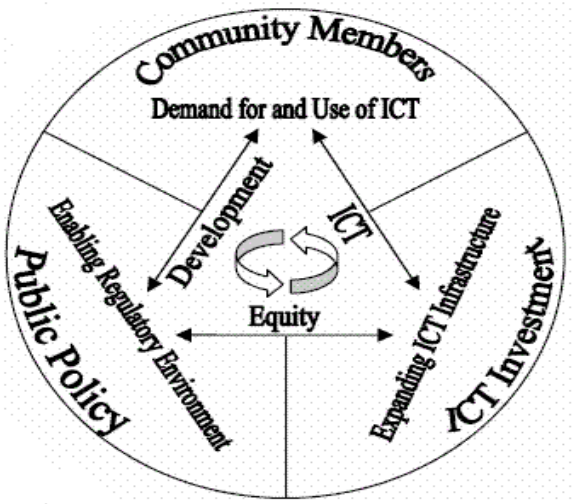
predominant perspective of the role of ICTs for poverty reduction has been described as being techno-centric and deterministic and providing unwarranted claims about the future impact of ICTs on the lives of poor in the developed world (Moodley and Cloete 2004).

The application of the UNDP model and other related perspectives on the role of ICTs for poverty reduction in developing countries needs to be done with caution. It is evident from the literature that simple relationships between development and ICTs may not be realistic. Rodriguez and Wilson (2000: 3) pointed out that claims about the link between ICTs and progress are not correct and, in some cases, may be dangerously wrong. Mitchell and Gill (2002) claimed that ICTs are important tools, but not a solution in itself for economic or social problems. For ICTs to effectively influence development, other factors need to be taken into consideration. Some of these include the development and effective implementation of pro-poor national ICT policies, so as to ensure that the benefits of ICTs accrue to other sectors such as transportation, education and health services (AISI 2003; Etta and Parvyn-Wamahiu 2003: 27-28; OECD 2004).

3.4.2 Multiple stakeholder model of the Washington State University (WSU)

The WSU model that is illustrated in Figure 3.2 was designed by the Centre to Bridge the Digital Divide (CBDD) at WSU. The model introduced the idea of the involvement of multiple stakeholders in the deployment of ICTs for socio-economic development at the macro level. The parties that should be involved include the community, the ICT investors and the public policy (Mitchell and Gills 2002). It is through understanding the interaction of these stakeholders that one may be able to attribute socio-economic development to the deployment of ICTs in a defined community.

Figure 3.2: Washington State University model



Source: Mitchell & Gills (2002)

The community represents the top stakeholders in this model because it is the major beneficiary of any initiative to bridge the digital divide. The emphasis should be on making ICTs widely available and affordable, so that the community might utilise ICTs to expand local education, enhance local health care, improve civic interaction and develop mechanisms for community support.

Building the ICT infrastructure is the second dimension of the model. ICT infrastructure requires a significant capital investment, which may only be afforded by national governments. Many national governments in the developing world are unable to meet the challenges alone.

Many governments formulate public policies that enable and regulate the primary builders and providers of the ICT infrastructure. The makers of public policy have a responsibility to develop and maintain an enabling regulatory environment that encourages investment by private organisations and businesses in ICT infrastructure. Public policies regulate telecommunication service providers in order to protect public interests in the absence of state ownership (Parker, Kirkpatrick and Theodorakopoulou 2005). Wallsten (2002) pointed out

that telecommunication sector regulators have an important role to play in poverty reduction efforts using ICTs. Regulators can fulfil this role by promoting and facilitating universal access to networks and bridging the digital divide. Without efficient and well-grounded regulatory process, efforts to use ICTs for poverty reduction are less likely to be successful (Ure 2003).

The WSU model supports the whole idea of telecommunication sector reforms, to bring ICT services to the majority. The model emphasises the importance of having an effective regulatory regime as a way of leveraging the role of ICTs for development and poverty reduction. The application of this model in the context of developing countries can be seen in the current trends towards liberalisation of the ICTs sector and the move away from monopolistic provision of the ICTs services and the introduction of competition in the sector.

In many developing countries the regulatory agencies have played a very important role in improving the accessibility of ICT facilities, especially in urban areas. The challenge of bringing ICTs to rural areas where the majority of people in developing countries live, and where poverty is deeply rooted, is still huge. Studies have shown that it is not clear whether and how regulators attempt to gauge the views of the poor and there is a concern that regulators receive most of their information from the regulated firms, politicians and higher income groups or elites (Parker, Kirkpatrick and Theodorakopoulou 2005).

To be effective ICT regulators in developing countries need to understand the needs of the poor, their location and the real barriers to their access to adequate services. The ICT regulators need to understand the different ways in which the interests of the poorest might be best advanced. Therefore, much more needs to be done to enhance the role of regulatory agencies in poverty reduction using ICTs.

The major emphasis of the WSU model is on regulating the ICTs market so that developing communities may benefit through the application of ICTs. Consequently, WSU is working towards strengthening regulatory capacities in Africa. The goal of the WSU programme is to enable African telecommunications regulatory communities to draft advanced-level policies

that will lead to effective and efficient telecommunications markets (WSU, CBDD 2006). As the UNDP model, the WSU framework tends to be techno-deterministic, as it almost equates technological advancement with social progress without taking into consideration the political, social and economic dynamics of individuals, countries and organisations (Henwood *et al.*, 2000: 9-11). In fact, according to Loader (1998: 15):

> The development of the information society is not likely to be characterised by a linear technological progression, but rather through the competing forces of innovation, competitive advantage, human agency and social resistance (cited in Henwood *et al.*, 2000: 15).

Indeed, the other models discussed in this section warn against a simplistic and deterministic view of the role of ICTs in poverty reduction (Heeks 2005a).

3.4.3 Information and communication technologies and socio-economic development models

The three models proposed by Heeks (2005a) emphasise the interplay of various factors in the effective implementation and utilisation of ICTs for development and poverty reduction in developing countries. The models comprise the onion-ring model, pull and push framework and the information chain approach (Heeks 2005a). Heeks' (2005a) models underscore the importance of affordability, skills, local content and the synergy between technology and people's lives. The following sub-sections discuss the models in detail.

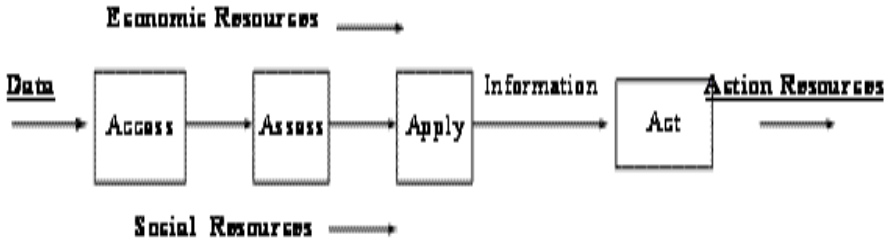
3.4.3.1 The information chain model

The role that ICTs play is to handle information. The contribution of ICTs to socio-economic development must be founded on an understanding of information in development and the information chain (Heeks 2005a). The information chain model (see 3. 3) shows that raw facts and figures must be obtained and evaluated. The data is then applied or adapted if it is perceived to be useful. The processed data then becomes information that may be used. Resources and certain environmental factors are needed to transform data to usable information. According to Heeks (2005a), the resources include:

- Data resources: relevant data should be available in the first place.
- Economic resources: money, skills and the technology to access the data.

- Social resources: the motivation, confidence and knowledge to access, assess and apply the data. People must trust the source.
- Action resources: people must be able to act on the decisions made with the information. This will require enterprise inputs (for example, money, skills, technology and raw materials).

Figure 3.3: The information chain model



Source: (Heeks 2005a)

Deficits in any of the resources outlined above may threaten the effective functioning of the ICT information chain and become access barriers for poor people (Heeks 2005a). In most cases many of the resources needed to facilitate the functioning of the information chain are lacking in most developing countries. An access barrier occurs if one of the resources was missing. It is futile to introduce ICTs to a community and hope that they would reduce poverty, without understanding the dynamics of how the resources would come into play.

The application of the information chain model, in a study that investigated the role of ICTs in developing countries' small and medium scale enterprise, illustrated that ICT application had a great potential in these enterprises (Duncombe and Heeks 2002). ICTs could substantially lower the communication costs in this sector. It was found that, too often in many of these small/micro enterprises, data about customers, prices, suppliers, laws and business services was not readily available. In some cases data was available but the entrepreneurs were not able to access it because they did not know about its existence. In other cases data was accessed but entrepreneurs were not able to apply or act on it due to limiting economic

resources. For instance, entrepreneurs were able to identify new customers but could not afford to purchase materials to supply these customers.

Hellström (2005) used the information chain model to study an ICT project in Uganda in order to establish how on-the-ground efforts to bridge the digital divide were carried out. Hellström (2005) discovered that the approach to ICT that the project was using was not holistic and the whole information chain was not taken into account. The study found out that there was a need to create more data resources in terms of locally produced content. Economic resources such as telecommunication infrastructure, electricity supply, money to buy ICTs and skills infrastructure to keep the technology working were inadequate. This constituted a major access barrier.

Hellström (2005) study recommended that the ICT approach applied to projects in developing countries should have overall goals, establish how information meets those goals and determine how ICTs might help. That means that the whole information chain needs to be taken into account. Heeks (2005a) stressed that unless the whole information chain operates successfully, there can be no contribution of information, including ICT-based information to development. Heeks (2005a) insisted that the information chain is the reminder that the disadvantaged remain at a disadvantage because of the divides and inequalities related to accessing information chain resources.

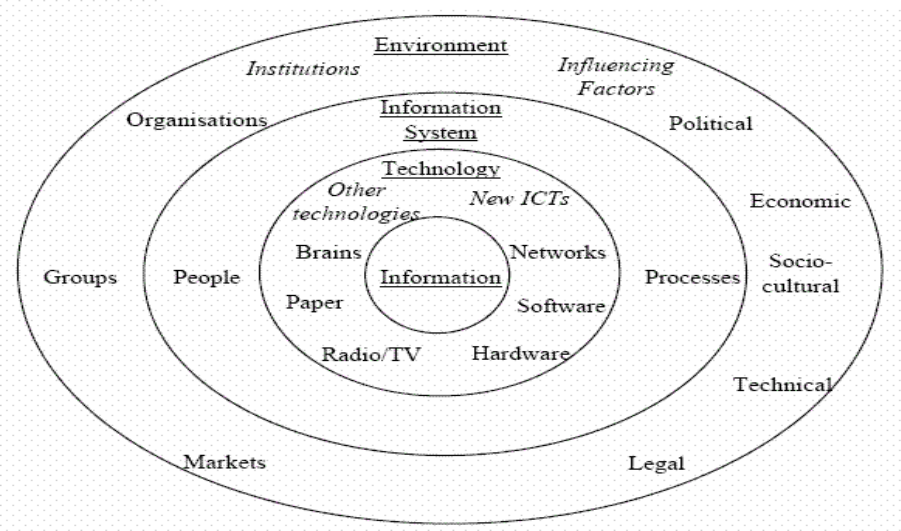
3.4.3.2 Onion ring model

The onion ring model illustrated in Figure 3.4 presents an information-centred approach to the role of ICTs in socio-economic development. The model (Heeks 2005a) underscores the fact that in many e-development projects there is too much focus on the technology. The model suggests that technology must be understood in its context if it is going to contribute to any meaningful development and to poverty reduction. As the information chain model, this framework puts a lot of emphasis on the central role that information plays in development. The three lessons that are fundamental to using the model as a tool for socio-economic development are (Heeks 2005a):

- To understand the role of ICTs in development, a good start is to first understand the role of information.
- The role of ICTs in development should be understood by embracing and taking into account all other information-handling technologies, such as paper-based information systems, and old ICTs such as radio and television. However, in most cases these other technologies are ignored and ICTs are placed above other information handling tools.
- The information systems need to be understood within their context. This includes organisations, institutions, political, economic, cultural factors and the context in which the systems operate.

Projects that ignore these lessons during implementation are bound to fail (Heeks 2005a).

Figure 3.4: Onion ring model



Source: (Heeks 2005a)

The concept of ICTs for poverty reduction should be approached from the information-centred way and not just from the technology perspective. This will help to achieve a sense of continuity between new ICT-based information systems and old information systems such as radio, television, mass media, telephone or even oral culture. Placing information first and technology second may facilitate better choices from a range of possible technologies that best meet information needs of a given community. In other words, the approach of ICTs must be information-centred, integral to its environment, integrated with development objectives interconnected and indigenised (Heeks 2002). All the layers of the onion should be

taken into consideration if ICTs are to have the desired effect. That means that future development priorities should be i-development (information development), instead of e-development (electronic development), in order for them to have an impact on poverty alleviation (Heeks 2002: 9). A study of small-scale/micro enterprises in Botswana demonstrated that there is a need for an integrated approach in ICTs application if these enterprises are to benefit from ICTs (Duncombe and Heeks 2002).

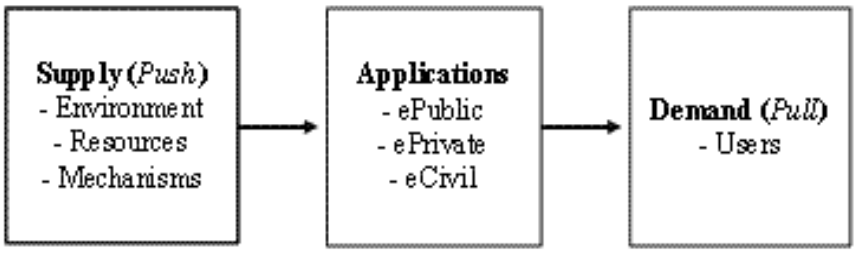
3.4.3.3 The push and pull model

Figure 3.5 depicts the push and pull model and demonstrates that there has been a lot of pushing from the supply side in the e-development community. Thus, much of emphasis has been placed on the supply of the infrastructure, the resources and the applications, such as e-commerce, e-government and e-health, without taking into consideration the demand side of the equation. Limited research has been done on user demand of ICTs services (Heeks 2005a). To emphasise the need for the demand side analysis of ICT services, Gillwald (2005a) pointed out that the supply side of the equation must be allied with an adequate understanding of the demand side. Consequently, it is important to find out what factors impact on users and consumers of ICTs technologies, if ICTs are to be effectively implemented in developing countries. In the words of Tusubira, Kaggwa and Ongora (2005):

> Long-term impact and success of rural communications development interventions require base lining and demand side analysis. Unfortunately, all studies and analyses to date have taken only a supply-side approach to sector statistics.

However, as compared to the onion ring model and the information chain model not much research has been done on the push and pull model and hence there was limited literature on the model.

Figure 3.5: The push and pull framework



3.4.4 Sustainable livelihoods framework

The sustainable livelihoods framework is an approach to development and poverty reduction which has evolved from changing perspectives on poverty, participation and sustainable development (Carney 1998; Chambers and Conway 1992, DFID 2001). Criticism of narrow indicators of poverty that are confined to income alone led to interest in the livelihoods framework, which is based on a holistic perspective to understanding poverty (Moser 1998). The livelihoods framework focuses on sustainable local-level poverty reduction strategies, which strengthen people's own inventive solutions. According to Chambers and Conway (1992: 26):

> A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets, both now and in the future, while not undermining the natural resource base.

A sustainable livelihoods framework based on the DFID (2001) (see Appendix 3.1)[11] includes the following major principles: capital assets, vulnerabilities context, processes and livelihoods outcomes that are all related to poor livelihoods. The sustainable livelihoods framework identifies five types of assets or capital, upon which livelihoods are built. Increasing access (ownership or rights to use) to these assets can make a central contribution to poverty reduction. These assets (as indicates in section 1.7.3) include the following:

[11] The illustration for the sustainable livelihoods framework, is too big to be included within the chapter, thus it is included as an appendix 3.1

- *Human capital* represents the skills, knowledge, ability to labour and good health that together enable people to pursue different livelihood strategies and achieve their livelihood objectives.
- *Social capital* is the genre of social resources upon which people draw in pursuit of their livelihood objectives and includes networks, participation in social or productive groups and mutually-beneficial relationships.
- *Natural capital* is the term used for the natural resource stocks from which resource flows and services useful for livelihoods are derived.
- *Physical capital* comprises the basic infrastructure and producer goods needed to support livelihoods.
- *Financial capital* denotes the financial resources that people use to achieve their livelihoods, such as available stocks, which can be held in several forms such as cash, bank deposits, liquid assets such as livestock and jewellery, or resources obtained through credit-providing institutions and regular inflows of money, including earned income, pensions and other transfers from the state and remittances.

The vulnerability *context* includes: trends such as population change, national and international economic trends; shocks such as natural disasters, epidemics, civil conflict and economic crises; seasonal variations in prices, costs, production, food supply and economic opportunity.

Processes include institutions, organisations and policies which are crucial in shaping livelihoods. They operate at all levels, from the household to the international level, and in all spheres, from the most private to the public.

Livelihood outcomes are the achievements or outputs of livelihood strategies. They could include outcomes such as higher income levels, an increased sense of well-being, reduced vulnerability, improved food security and more sustainable use of natural resources bases. Livelihood outcomes are sustainable when they are resilient in the face of external shocks and stresses.

The sustainable livelihoods framework is widely used in the field of development, but the framework is increasingly used in the context of ICT-based development initiatives (Arun,

Heeks and Morgan 2004; Richardson 2005; Souter *et al.,* 2005). In addition, Heeks (1999) pointed out that, as ICTs continue to diffuse and as greater attempts are made to apply them to current poverty-focused agenda goals, there are increasing opportunities for livelihoods frameworks and tools to make a contribution to understanding ICTs and development. Gerster (2006) emphasised that application of the livelihoods framework in poverty reduction initiatives using ICTs is of paramount importance, because the role of ICTs in poverty reduction is not limited to reducing income poverty, but includes non-economic dimensions such as empowerment, disadvantages in access to land, credit and services (for example health and education); vulnerability (towards violence, external economic shocks, natural disasters); powerlessness; and social exclusion. The use of the sustainable livelihoods framework is useful in this study because bridging the digital divide is not merely about increasing the number of telephone lines or providing improved internet access, but is basically about impacting the lives of people and empowering them through ICT (Singh 2006).

While information, knowledge and communication are not explicitly acknowledged in the livelihood frameworks, they are crucial to people's ability to develop appropriate and sustainable livelihoods strategies. Their influence is seen in all the main building blocks of the livelihoods framework outlined above. By introducing new modes of communication, information acquisition and knowledge-sharing, ICTs may add to the pattern of communication flows available for managing and enhancing the livelihoods frameworks. For instance, much of the vulnerability that people face comes from lack of knowledge or information. Farmers can be vulnerable to the market power of intermediaries and large companies if they have less information than they do about trends or short-term changes in market prices in other places, particularly where there is limited competition to purchase their produce (Souter *et al.,* 2005).

Knowledge is the major component of human capital. Knowledge may be derived from informal and formal education, from personal experience, exposure to information from mass media and ICTs and exchange of ideas among friends and acquaintances. Knowledge of principles, processes and practical skills is essential to people's ability to make effective use

of (and to increase) their natural, financial and physical assets. In addition, social capital provides structures and networks through which information is accessed and experience is shared and through which support can be derived in times of difficulty or prosperity. Through communication networks based on social capital, people enhance their knowledge, gain access to information and co-operative resources. ICTs are crucial in this regard, as they can facilitate communication and assist in generating information required by the rural poor to enhance capital assets and make decisions on livelihood strategies (Souter *et al.*, 2005).

The intention of the sustainable livelihoods framework is to employ a holistic perspective in the analysis of livelihoods, in order to identify a manageable number of key entry points where an intervention could be strategically important for effective poverty reduction (Chapman, Slaymaker and Young 2005). The livelihoods framework does not necessarily aim at addressing all aspects of the livelihoods of the poor in a single intervention. For the purpose of the present study the focus was particularly on the vulnerability context, in general, and on three of the five capital assets whose access seems most likely to be susceptible to the characteristics of ICTs. These include financial assets (such as income), social assets (such as networking) and human assets (in particular, access to and use of information and knowledge resources).

The present study is guided by ideas distilled from all the models discussed above. The study will propose a new model based on lessons learned from all the models and the empirical findings of the study (see section 7.5 in Chapter Seven).

3.5 Prominent global initiatives in ICTs for socio-economic development discourse

The literature on the link between ICTs and socio-economic development has been through several different stages. The following section provides an overview of the different stages there have been in the progression of thinking (views and theories) about the link between ICT (and technology more generally) and development.

3.5.1 Modernisation theory and stages of development

Different scholars have associated the contemporary debates about ICTs for development and the modernisation theory by Rostow in the 1960s (Benjamin 2001b; Moodley and Cloete 2004; Nulens 2003; Ojo 2004; Pool 1990: 283; Trujillo 2003; Wilson 2001). Rostow (1960: 4-10) suggested an economic theory of development which saw development as a process of 'modernising' the economies of countries of the south, which could lead to economic "take-off" when the economy became self-sustaining. Rostow's model postulates that economic modernisation occurs in five basic stages, of varying length. These include: traditional society; preconditions for take-off; take-off; drive to maturity and age of high mass consumption. The modernisation theory presumed that the transfer of capital goods, technologies, industries and western norms to the developing countries would bring rapid economic productivity and social development in the developing countries, which were considered to be ancient and primitive (Melkote and Steeves 2001: 85).

On the basis of the modernisation theory, ICTs would be seen as an essential part of modernisation, due to some similarities that exist between the modernisation theory and the current assumptions of the ICT for development discourse. The essence of the modernisation theory was the binary opposition between the developed and underdeveloped and the need for the underdeveloped to 'catch-up' with the developed. Similarly, ICTs have led to the emergence of a classification of people as 'information-rich' or 'information-poor', depending on the availability of ICTs and the need for the information poor to "catch up" with the information rich. There is an urgent need to transfer technologies to less-developed countries, for these countries to participate in the information society. The World Bank (1996) cautioned:

> If African countries cannot take advantage of the information revolution and surf this great wave of technological change, they may be crushed by it. In that case, they are likely to be even more marginalised and economically stagnant in the future than they are today.

Moodley and Cloete (2004) warned that ICTs may have important contributions to make for holistic development, but not when narrowly applied in terms of models of development as catching-up to developed country ideals.

3.5.2 The Jipp curve

Some early thought about the relationship between ICT (telecommunication in particular) and economic development came from a scientist called Jipp, who was an ITU collaborator. Jipp (1963) showed that there was a close relationship between the wealth of a country and its telecommunications infrastructure - the bigger one is, the bigger the other will be. This relationship was presented in a form of a curve which is now called the "Jipp curve." The Jipp curve was the first attempt to quantitatively explore the interplay between telecommunications infrastructure and development. The Jipp curve showed an underlined strong linear correlation between telephone density and GDP in different countries.

Jipp (1963) explained that the growth of telecommunications plays an essential role in the general development of a country, by creation of value-added, job creation and improved services. The Jipp curve logic is currently used in estimating, and in determining, the number of telephone lines to be built in a country or in deciding about the number of telecom operators to be licenced (Jeunhomme 2000).

3.5.3 The missing link report

The ‘missing link’ report was the first major report to focus attention on the development impact of telecommunications. The report was released by the Independent Commission for Worldwide Telecommunications Development under the International Telecommunication Union (ITU) (ITU 1984). The report claimed that telecommunications was the ‘missing link’ in development, meaning that a sluggish telecommunications sector was the reason why some countries were slower to develop than others. A focus on telecommunications development was noted as essential for a country’s economic development.

The ‘missing link’ report explained that the role the telecommunication sector can play in enhancing the quality of life has been inadequately appreciated. The absence of a system

which enables timely information to be sent and received, especially in developing countries, engenders a sense of isolation and frustration and raises a barrier between different sections of the population and undermines the process of development.

Telecommunications have often been seen as a luxury, to be provided only after other investments, for instance, in agriculture, health, education, water and roads, have been made. The report emphasised that the alternative is to regard telecommunications as an essential component in the process of development, a component to other investments which can raise the productivity and efficiency of agriculture, industry, commerce (including international trade and tourism) and social services and enhance the quality of life in the developing world.

The report explained that, while the important economic advantage of satisfying demand for telecommunication services in urban areas should not be ignored, extending the network into rural areas and remote areas was essential if the aims of development were to be achieved. Therefore developing countries should aim at ensuring that the whole population has reasonable access to the telephone. In addition, the report brought to light the issue of disparities in the extent of telecommunication services and its quality between industrialised and developing countries.

Kenny and Keremane (2007) reported that, in 1984, the aftermath of the Maitland Commission report saw the target set of every country in the world having access to at least one telephone per 100 people. Fifty-six countries were below this target level in 1984 and four countries had less than one telephone per 1000 people. However, in 2004 the report from ITU said that only one out of the 133 economies for which the International Telecommunications Union (ITU) had data remained below 1 percent mobile and fixed teledensity (ITU 2005b).

The scope of the ‘missing link’ report was limited, as it was mainly concerned with access to fixed-line telephone networks and, to a lesser extent, telex, rather than today’s wider concept of information and communications technologies (ICTs). ITU 2002 asserted that today the ‘missing link’ is referred to as the ‘digital divide’. The term is commonly taken to apply to

differences in access to the internet and other ICTs, which might be much less evenly distributed than the telephone.

3.5.4 Knowledge for development - World Development Report of 1998

The World Development Report of 1998 focused on the transition from industrial to information economies and the importance of knowledge and information to development. The report asserted that "knowledge is like light, weightless and intangible, it can easily travel the world, enlightening the lives of people everywhere. Yet billions of people still live in the darkness of poverty – unnecessarily" (World Bank 1998: 1).

The report proposed a new way of looking at the problems of development, that is, from the perspective of knowledge. This new approach to development was based on the assumption that poor countries and poor people differ from rich ones, not only because they have less capital but because they have less knowledge. The report explained that knowledge illuminates every economic transaction, revealing preferences, giving clarity to exchanges and informing markets.

The focus on the role of knowledge in development processes is the result of new understanding about the relationship between economic growth and the application of knowledge and that ICTs can provide the appropriate tools for accessing, archiving, transferring and communicating information and knowledge. The report explained that ICTs may greatly facilitate the acquisition and absorption of knowledge, provide opportunities to enhance educational systems, improve policy formation and execution and widen the range of opportunities for business and the poor. They thus help to close knowledge gaps and information problems and reduce their impact on development. The report presented ICTs as technologies that may function as a conduit for the information and knowledge required to achieve development.

3.5.5 Digital Opportunity Task Force

This is another prominent initiative in the ICT for development debate. After a year of discussions, a report was submitted to, and approved by, the Group of the eight most-

industrialised nations, referred to as the G-8 at the Genoa Summit in 2001. The report was called the "Digital Opportunity Task Force (DOT Force) Report." It pointed out that ICT can play a major enabling role in reducing poverty and in supporting and strengthening institutions in developing countries. As a result of this initiative, ICTs are not only being linked to economic development, but to broader developmental goals, as well (DOT Force 2001).

The DOT Force stated that, when wisely applied, ICTs offer enormous opportunities to narrow social and economic inequalities and support sustainable local wealth creation and thus help to achieve the broader development goals that the international community has set. ICT can provide new and more efficient methods of production, bring previously unattainable markets within the reach of local producers, improve the delivery of government services and increase access to basic social goods and services. ICT can thus help to ignite a virtuous circle of sustainable development.

The report explained that ICT cannot, of course, act as a panacea for all development problems, but by dramatically improving communication and exchange of information, they can create powerful social and economic networks, which, in turn, provide the basis for major advances in development.

3.5.6 Other global initiatives in the ICT for development discourse

After the initial global initiatives that established the link between ICTs and development and poverty reduction, many more multilateral organisations became supportive of the discourse and a number of projects were initiated to bring new technologies to developing countries. This section discusses some of the initiatives.

3.5.6.1 World Summit on Information Society (WSIS)

Among the most salient international initiatives in the ICT for development discourse was the World Summit on Information Society (WSIS), organised by the ITU. The aim of the WSIS was to develop a common vision and understanding of the "information society" and to draw up a strategic plan of action for concerted development towards realising this vision (WSIS

2006). The WSIS aims to bring together heads of state, executive heads of UN agencies, industry leaders, non-governmental organisations and civil society. The first phase of the summit took place in Geneva in December 2003 and the second phase took place in Tunis in November 2005. One of the chief objectives of the WSIS was to bridge the digital divide separating rich countries from poor countries, by spreading access to the internet in the developing world (WSIS 2006).

Tanzania participated in the two conferences. According to URT (2004d) various actions have been taken by the government to implement the WSIS objectives and plan of action. These include:

- Policy reforms on institutional arrangement. This include the formulation of harmonized policies that recognize the role of private sector and the importance of public-private partnership participation in the development process
- Development of ICT infrastructure and financing. The government takes the lead in creating conducive environment and investing in the management of infrastructure development in order to attain sustainable services.
- Access to information and knowledge for the benefits of all stakeholders including individuals and institutions
- Capacity building, which include human resource development, education, training and research.
- ICT applications and security – Tanzania in collaboration with other countries and local and international institutions has started working on ensuring that strategies for promotion of ICT applications and content suited to local needs are put in place.
- Culture and linguistic diversity, which include the development of local content and media development
- Enabling environment, which include legal and regulatory framework in order to create a truly worthy, transparent, and non-discriminatory legal, regulatory and policy environment.

However, most of these programmes are still going-on and they have not being fully achieved.

3.5.6.2 United Nations' ICT Task Force

The United Nations' ICT Task Force is another international initiative aiming at promoting the use of ICTs in development and poverty reduction efforts. The UN's ICT Task Force (2002: 1), is mandated to lend a truly global dimension to the multitude of efforts to bridge the global digital divide, foster digital opportunity and thus firmly put ICT at the service of development for all. The initiative attempts to increase the impact of ICTs in achieving developing countries' development goals by building on the strategic framework developed by the Digital Opportunity Initiative at the 2001 G-8 Summit in Genoa.

3.5.6.3 The World Bank's Global Information and Communication Technologies Department (GICT)

The World Bank's Global Information and Communication Technologies Department (GICT) is another international initiative in the ICT for development discourse. The mission statement for the GICT is that:

> Information and communication technologies are opening new opportunities for developing economies. These opportunities will assist developing countries in bridging the digital divide through economic growth, increased jobs, and improved access to basic services. GICT was created to leverage the strengths of the World Bank Group in addressing these needs and taking advantage of these opportunities (GICT 2006).

The World Bank provides a variety of resources and services to the ICT sectors of developing countries, including loans, expert advice and access to the Information for Development Programme (InfoDev). In return for its loans and services, the Wold Bank negotiates economic and institutional conditions that must be met by the borrowing government. The World Bank and the ITU, for example, are sponsoring initiatives to ease the transition by developing countries towards 'knowledge societies'. Closely associated with the ITU is WorldTel, an entity designed to raise private sector funds for investment in telecommunications.

To sum up the discussion of global initiatives in ICTs for socio-economic development Kenny (2002) pointed out that ICTs have a role to play in broad-based, cross-sectoral poverty-reduction strategies and universal access policies are being promoted to improve access to ICTs, especially in rural areas of developing countries. UNDP (1999) further asserted that ICTs have the potential to improve the welfare of the poor in a number of ways. These include:

- Opportunities to increase social capital;
- Improved availability of market information;
- Creation of new economic opportunities;
- Improved economic efficiency and competitiveness;
- Better access to health and education facilities;
- More efficient and effective governance. These were also pointed out by Grace *et al*. (2001) and ILO (2001).

3.6 African initiative in the ICT for development discourse

Based on the above developments and ways of thinking on the role of ICTs for development, several initiatives were taken on the continent of Africa and other developing countries, to facilitate this role.

3.6.1 African Information Society Initiative

Efforts to promote access to ICTs in Africa have been on the agenda of meetings of high-level policy-makers since the early 1990s (AISI 2003; Etta and Parvyn-Wamahiu 2003: 29). The maturation of the idea of universal access and emergence of community telecentres came into being in 1996, when the United Nations Economic Commission for Africa (UNECA) created a framework for the formation of an African Information Society Initiative (AISI) (AISI 2003).

The aim of the AISI was to support and accelerate socio-economic development in the region, by focusing on strategic programmes and projects which can assist in the sustainable build-up of an information society in African countries (AISI 2003). An information society is defined as a society in which the creation, distribution and manipulation of information is becoming a

significant economic and cultural activity. The knowledge economy is the economic counterpart of the information society, whereby wealth is created through the economic exploitation of knowledge. It refers to an economy where knowledge is acquired, created, disseminated, and used effectively to enhance economic development (Derek, Chen and Dahlman 2005). Dordick and Wang (1993) explained the information society as the society in which the production, distribution and consumption of knowledge and information are the driving force for change.

One area of priority in the AISI was the improvement of access to ICTs in rural areas, for which telecentres was a recent strategy (AISI 2003). Since then, the telecentre concept has continued to receive attention and support from the international development community. Among the developing agencies which are active in improving access to ICTs in rural areas include IDRC, UNDP, ITU and the World Bank. These, in return, have resulted in many pilot telecentre projects. As the initial stages of the implementation of the AISI in Africa, over 20 projects were implemented in Ghana, Mozambique, Uganda, Benin, South Africa, Zambia, Zimbabwe and Tanzania (Etta and Parvyn-Wamahiu 2003: 4; Fuchs 1997).

3.6.2 New Partnership for Africa's Development

The New Partnership for Africa's Development (NEPAD) is anchored in the determination of Africans to extricate themselves and the continent from the malaise of underdevelopment and exclusion in a globalising world. NEPAD is premised on African states making commitments to good governance, democracy and human rights, while endeavouring to prevent and resolve situations of conflict and instability on the continent (NEPAD 2005).

NEPAD recognises the pivotal role of ICT in accelerating economic growth and development, particularly in the context of achieving a common market and continental integration. ICTs have the potential to foster intra-regional trade and enhance Africa’s global competitiveness. NEPAD is committed to initiatives to raise the necessary resources to address development issues in critical sectors such as infrastructure, education, health, agriculture and ICTs through its NEPAD e-commission (NEPAD 2005).

The e-Africa Commission was established in 2001, with a mandate to manage the structured development of the ICT sector on the African continent, in the context of NEPAD. In terms of ICT development, NEPAD has an e-Africa Commission, which is a NEPAD task team responsible for driving the NEPAD ICT programme. The responsibility of the e-Africa Commission is to accelerate the development of ICT infrastructure and its usage for ICT applications and services. Currently, e-Africa focuses on the following:

- e-Policies and strategies;
- ICT infrastructure;
- Human development (e-school, e-health, e-skills);
- Business development and entrepreneurship;
- Special programme (women and youth);
- Local content;
- e-Applications, e-government, e-commerce;
- Internet and software development;
- Institutional development, capacity building;
- Public e-awareness (e-Africa commission 2006).

The Commission is also required to develop broad strategies and a comprehensive action plan for ICT infrastructure and its use for ICT applications and services (e-Africa Commission 2006). NEPAD/Africa e-Commission has a number of projects which are currently operational. Prominent among these is the East Africa Submarine System (EASSy) cable.

3.6.3 The East Africa Submarine System cable

This is one of the most fundamental initiatives of the NEPAD e-Commission in which Tanzania is taking part. The 9,900km EASSy cable will run from Port Sudan in the north to Durban and will complete the fibre loop surrounding Africa. It promises to lower connectivity rates. EASSy will connect over twenty coastal and land-locked countries in east and southern Africa via a high bandwidth, undersea fibre optic cable system and terrestrial backhaul links to the rest of the world.

The aim of the EASSy project is to increase accessibility to information and communication technologies by significantly reducing the current prohibitive cost of telephony and internet connectivity. Consequently, this will boost regional competitiveness and enable Africa to participate more actively in the global economy.

The EASSY cable will be owned and operated by telecommunications operators, while governments and the NEPAD e-Africa Commission will assume a leadership role in pursuing an enabling policy and regulatory framework. The EASSy project is said to have the potential to dramatically improve the communication landscape of Africa and to serve as a catalyst for further private sector development, economic growth and, ultimately, opportunities for the poor. A similar cable, known as SAFE/SAT-3, was constructed to link west and southern African countries to the rest of the world, through Portugal (NEPAD 2006a; NEPAD 2006b).

The major aim of all these international and regional initiatives is to bring ICTs to developing countries, to help these countries bridge the digital divide and hence to participate in the information society. In order to help developing countries to bridge the digital divide these initiatives may play a role as an instrument or as an arena (Archer 1992: 135). In other words:

- These initiatives may play a role an as instrument used by its members to achieve certain goals. Member states may use these initiatives as a convenient tool to achieve foreign policy objectives.
- The international and regional initiatives may act as an arena or as a meeting place, where members convene to discuss issues and, if possible, come to agreement over such issues. The WSIS conferences, where all the countries of the world were represented to discuss various issues related to ICTs, are a case in point.

3.7 Telecentres, access to ICTs and socio-economic development

Provision of ICT services to remote and rural communities was first introduced in Sweden in the mid-1980s, in the form of telecentres (Bernhardson 1998; Ellen 2000; Etta and Parvyn-Wamahiu 2003: 13; Fuchs1998; Latchem and Walker 2001: vii; Molnár and Karvalics 2002: 328). Telecentres provided a model of shared use and commonly, rather than individually, owned ICT resources. This is mainly the case in rural area where infrastructure development

is limited. The 1980s telecentres in Scandinavian countries were established as 'social experiments' in promoting the use of advanced information and communications technology (Benjamin 2001b; Cronberg *et al.*, 1991). These centres were largely seen as learning experiences and were useful for letting people experiment with different ICTs, especially farmers. The Swedish telecentres contributed to raising awareness and creating demand for ICTs among rural communities. Most of the telecentres introduced around the world today imitate the Swedish social model.

Soon after these first Scandinavia centres were established, similar projects were established in other parts of Europe and North America (Benjamin 2001b). Telecentres experienced fairly rapid growth in Western Europe and other industrialised countries where rural isolation, lack of purchasing power and low-quality telecommunications and information technology facilities were seen to be a hindrance to participation in the information economy. After these initial telecentre projects were introduced in developed countries, international and national development agencies recognised the potential of telecentres and are supporting initiatives in various parts of the globe (Latchem and Walker 2001: viii). As a result, telecentres have been one of the main strategies for providing universal access to telecommunications and information services in the past few years and they are used as a means for bridging the digital divide.

3.7.1 Definition of a telecentre

There are many different types of public access ICT projects, in many different countries, that can be called telecentres. Colle and Roman (1999) identified over 30 different names for these kinds of centres. Some of these are telecentres, telecottages, community technology centres, community communication shops, networked learning centres, multipurpose community telecentres, digital clubhouses and technology access centres. Other names used by (Latchem and Walker 2001) are phone shops, open learning centres and digital clubhouses. (See section 1.7.7 for definition of telecentres).

Telecentres vary a great deal, especially in their sizes, facilities and services, according to whether they are rural or urban and whether they are located in the developed or developing

world. Some provide only basic telecommunications services and are best referred to as "phone shops" or "public call offices" (Latchem and Walker 2001).

Different authors defined the term telecentres differently. Colle (2002) defined a telecentre as a public facility in the community that affords people the opportunity to use computers, networks, photocopiers, scanners, telephones, printed materials and audio and video resources for information searching, communication, training and entertainment. The services provided in telecentres are either free or available at an affordable cost. According to the definition of Colle (2002), the primary mission of a telecentre is community services, as compared to internet café, whose primary mission is profit.

To differentiate further telecentres from the internet/cyber café, Carvin (2005) said that what differentiates telecentres from internet cafés is the explicit purpose of the first ones to become instruments for human development, to channel local needs and to contribute to a change in community reality. Carvin (2005) pointed out that one of the main dangers posed to the survival of telecentres is their transformation into "internet café-type" facilities. That is to say, to stop being focused on human development and democratisation of technologies and being instead turned into spaces solely aimed at consumption and entertainment. Experience from FADECO telecentre in Tanzania, as described by Tan (2007), shows that there is a great temptation to convert the telecentre into a public internet café, to increase income. Concerns, however, are that it may lead to uncontrolled use, such as pornography.

Kanfi and Tulus (1998) defined a telecentre as a location which facilitates and encourages the provision of a wide variety of public and private information-based goods and services and which supports local economic or social development. Benjamin (2001b) defined a telecentre as an organisation offering telecommunication and other information services to a disadvantaged community. Etta and Parvyn-Wamahiu (2003: 13) defined telecentres as an integrated information and communication facility that houses a combination of new and not-so new ICTs, for example television, video, facsimile, telephone, computers with internet connectivity and sometimes books.

According to Whyte (2000) the term telecentre appears to have no universally accepted definition, beyond the general concept of a physical centre to provide public access to long-distance communication and information services, using a variety of technologies, including phone, fax, computers and the internet. Parkinson (2005) explained that the term telecentre encompasses most variants of shared access facility with an explicit development objective. Most telecentres are multipurpose, offering a range of services and ICTs, often including photocopying, computer typesetting, faxing, internet (although many are beset by connectivity problems), phone and computer training, plus other value-added services that vary from site to site. While there are various definitions of telecentres a common characteristic of telecentres is a shared facility that provides public access to ICTs for educational, economic and social development.

3.7.2 Different models of telecentres

Beyond the common element of public access to ICT services, there is great variety in the way that telecentres are funded, owned and operated. Telecentres vary in the way they serve different kinds of clients and use different technologies. As a result, there are various different models of telecentres. Based on the work of Benjamin (2001b) and Jensen (1998) there are two distinct models of telecentres in developing countries. These include ‘type A’ telecentres, which are smaller, demand-driven private telephone shops and ‘type B’ telecentres, which are externally funded, larger ICT multipurpose centres.

Similar categories were used by Jensen (2004) who categorised telecentres into two groups. The first group is those that are emerging from entrepreneur-driven initiatives or through expansion of services at existing public 'telephone shops' and in other businesses. Examples of these include the locally emerging private sector telecentres in Senegal, where the Public Telecom Operator (PTO) transferred the operation of public payphones to small businesses. As a result, there are now over 10,000 of these public telephone shops, which are licenced by Sonatel (the PTO) and run by local entrepreneurs. Many have added fax, internet, email and word processing services and are serving a much broader range of information needs in their surrounding communities (Jensen 2004). Another example is the privately owned internet

cafés in Tanzania, commonly found in urban areas and in large and medium-sized towns in the country (Chachage 2001: 226; Mercer 2005: 247).

The second group is the national or international development programmes, which support non-profit telecentres driven by NGOs, government entities or international organisations. Examples of these are the multipurpose community telecentres established within the ITU, IDRC and UNESCO model in Tanzania, Mali, Uganda and South Africa (Etta and Parvyn-Wamahiu 2003: 4; ITU 1998). Others are telecentres established by the Universal Access Agency (USA) of South Africa (Benjamin 2001b; Parkinson 2005). In the case of Tanzania, telecentres established by the COSTECH, in collaboration with donor agencies, fall into this category. Telecentres established by external funding agencies, in partnership with local NGOs and/or government structures, are the most common type of telecentres in many African countries. The purpose of these telecentres is to 'bridge the digital divide', by reaching those who otherwise would be unlikely to access services. These telecentres are mostly located in places where the market is not providing such services.

Lewis (2004) and Jensen and Esterhuysen (2001: 3-4) categorised telecentres on the basis of sizes, type of equipment they have and the services they offer. Based on these criteria, telecentres can be categorised as micro-telecentres, small computerised telecentres, standard telecentres and major developmental telecentres.

3.7.2.1 Micro-telecentre

These are the smallest telecentres, which offer telephone services, as do phone shops or kiosks. The simplest kind of telecentre may be a mobile phone with the owner of the 'telecentre' selling air-time vouchers to people in communities where there are few or even no telephones. This model has worked well in countries such as Bangladesh, where the Grameen Phone project has been lending money to rural women to buy mobile phones since 1997 (Bayes, von Braun and Akhter 1999; Islam 2005).

3.7.2.2 Small computerised telecentre

These are phone shops which are starting to introduce a computer to extend their range of services, offering other business services (for example typing a letter or *curriculum vitae*). Some countries have a model of a basic movable stand that includes one computer, a 3-in-1 (printer, copier and scanner) and a telephone. Kiosks or outdoor units that provide telephone and internet access are becoming increasingly common. Some telephones such as the iPhone in South Africa have a modem and a built-in touch screen, keyboard and printout facility. Units like these may be installed at places such as general dealers or guesthouses, to sell access to telecentre services.

3.7.2.3 Standard telecentre

These are centres with a number of telephones and several computers that can be used for training and other information services. Where the telecentre has an internet connection many more communication and information services can be offered. The term telecentre most commonly taken to mean this kind of centre.

3.7.2.4 Major developmental telecentre

These are larger telecentres which were established, usually by international donor organisations. They often include a range of ICT equipment (computer labs, scanners, digital cameras, fax and phone systems) and aim to support a range of development activities in the community, for example the ITU, UNESCO, IDRC and UNDP have established large telecentres in Mali, Benin, Uganda, Tanzania and Mozambique.

3.8 Research in ICTs for socio-economic development

Review of the literature shows that empirical research to establish the link between ICTs and socio-economic development has developed through various stages. Although the development of literature on ICT and socio-economic development started in 1980s, with the ITU missing link report, actual research on the subject (ICTs for socio-economic development in rural areas) came much later. In these early years literature on the subject was dominated by background papers, literature reviews, evaluation case studies, project evaluation reports

and general analysis from various multinational organisations such as World Bank, WSIS, ITU, DFID and UNDP.

There was generally very little empirical research on the subject. To date, ICTs for socio-economic development is still a new field of study that contains few grand theories compared to other areas of social science (Gerald 2007).

A review of literature on the subject by Harris (2005) concluded that:

> Overall, there is more promise than reality on the link between ICTs for socio-economic development. More emphasis is on what could be done than on what is actually working. This suggests that there has been insufficient grounded research, as well as premature and possibly over-optimistic evaluations of what is currently taking place.

Nyaki (2000) pointed out that there are not many empirical studies on the relationship between ICTs and poverty. Most of the sound empirical studies are focused on telephones and the telecommunication sector in general. In South Africa a study by Snyman and Snyman (2003: 105) pointed out the absence of deep analysis at the government level on the suitability of the telecentre approach as the answer to universal access and dissemination of information to disadvantages rural areas. Various other sources, such as Duncombe and Heeks (2002), Heeks (1999), Rhodes (2005), World Bank (200l), UNDP (2001) and Souter *et al.* (2005), drew attention to the insufficient empirical research relating to ICTs for socio-economic development, especially in rural areas.

In section 3.9 historical development of the subject in different parts of the world is presented, followed by the review of empirical research from the relevant regions of the world.

3.9 ICTs, telecentres and socio-economic development in developed countries

The main aim of the first telecentres in Sweden was to provide basic telecommunication services for the local, isolated population. Telecentres in Sweden began with public investment to create a public good, in an attempt to build local capacity and provide people

with the tools and the skills to participate in the information society (Ellen 2000; Fuchs 1998; Molnár and Karvalics 2002). A case study research by Bernhardson (1998) found that the objective of the Faergelanda telecottage, which was the first telecentre to be established in Sweden in 1987, was to educate staff for the industry and the local government, to increase work opportunities and to supply ICT services to small and medium enterprises. About ten years after the birth of the first telecentre, the number of telecentres in European countries had grown to some hundred (Ellen 2000; Molnár and Karvalics 2002). Soon after these first Scandinavia telecentres, similar projects were established in other parts of Europe and North America (Benjamin 2001b).

In Spain Obra, Cámara and Meléndez (2002) reported that telecentres that provided ICT-related service were introduced in 1991 as an aid to socio-economic development and to increase employment opportunities in deprived rural and urban areas. In their empirical exploratory and descriptive study, which was carried out on a national scale on telecentre initiatives in Spain Obra, Cámara and Meléndez (2002) discovered that the telecentres were used mainly by the tele-workers. The ICT facilities in telecentres enable the tele-workers located in rural areas to work at a distance for companies in urban areas. The occupation of the users of these telecentres in Spain included data processing, translation, web page design and sales activities.

Moindrot (1998) reported that in the rural areas of Wales a network of telecottages was introduced in 1992. The telecottages were used for training rural communities in the new technologies and were also used for data inputting tasks and database management for the local government and local enterprises. The telecottages trained local small businesses owners, which resulted in familiarity with IT which, in turn, helped their small businesses grow.

Apart from the European and Scandinavian telecentres, the telecentre movement continued to grow in Canada, the United States of America and Australia. In Australia Suzuki and Chamala (1998) and Reeve (1998) reported that in the late 1980s a feasibility study was conducted to examine whether or not the telecentre concept developed in the Scandinavian countries was applicable to the Australian rural conditions. The study found favourable

interest in government and in rural communities. In the early 1990s, a number of experimental telecentres were established. These telecentres provided a range of programmes such as community distance education centres and computer-based public information access.

The telecentre network in Australia was used to address the educational needs of remote and rural communities and was used as a technology hub for a wide range of government and community services. The telecentres were used for internet-related services, computer-based services, resource centre services, social activities, government services, labour market programmes, community programmes, local enterprise, tele-education, tele-health and tele-law (Short 2001).

In the United States the first "community technical centre" was established in 1983 to reduce the gap that had evolved between the upper and lower layers of American society in the access to, and use of, basic technological and communicational devices. Greatest emphasis in these centres was placed on training, in addition to providing free access to the ICT means (Mark *et al.,* 1997) cited by Molnár and Karvalics (2002). The major aim of these American telecentres was technical, in contrast to the first Swedish and Danish telecentre experiments which were introduced later, in 1985 (Cronberg *et al.*, 1991).

In Canada, Downer (1998) reported that telecentres played a key role in the development of local skills, as they related to software applications, electronic mail, online databases, the internet and the World Wide Web. Most of the telecentre clients were members of the economic development agencies and/or the business community. The telecentres helped the local business community by providing them with information and assistance with the preparation of business plans and securing of funds from the government. Many local businesses came to the telecentres to learn how to develop brochures, Web pages, business cards, newsletters, posters and sales flyers. This type of service led to a much more professional image of local businesses and formed the basis of the area's privately owned desktop publishing business (Downer 1998).

Other rural ICT initiatives in Canada were the Remote Community Services Telecentre (RCST) project, which was an initiative developed to test the concept of a wireless multifunction telecentre for rural and remote communities in Newfoundland and Labrador province. The RCST implemented 13 specific applications, including telemedicine, tele-education, government services, internet services and business/community services (Sheppard 2001). Another initiative was the Kitimat Community Skills Centre in the northwest of British Columbia, which operated as the provider of educational technology in the community. The centre provided a satellite-based talk-back television system and videoconferencing facility, which was used to deliver course content from educational institutions and universities to the rural and remote communities (Hartig 2001).

Despite the earlier successes of the telecentres in Sweden, Europe, USA, Canada and Australia, the telecentre movement in these countries could not develop indefinitely. A research on Multipurpose Community Telecentres in rural and remote areas in Europe, North America and Australia (Ernberg 1998) showed that most of the telecentres closed down when government support was withdrawn. A study by Fuch (1998) discovered that, over time, the public investment of telecentres either entered a "contracts" phase or ceased to exist. Fuch (1998) said the Welsh, Australian and Swedish telecentres all moved to financing arrangements which were based on contracts with government agencies, health organisations, educational agencies or other institutions, to provide training, technical support and related information and communications services.

Fuch (1998) pointed out that, in the case of Wales, telecentres were converted from being diffusion catalysts into centres for the organisation and marketing of telework or distributed work. In the Canadian example, the telecentres were "re-invented", to become part of regional economic development or distance education. In Australia and Sweden, telecentres which lasted beyond the diffusion stage, moved to provide contract services to local and national markets that were willing, and interested in, data-entry and other IT related services.

The telecentre movement in Sweden, Europe, USA, Canada and Australia could not develop indefinitely. The great price reduction in personal computers in the early 1990s made it

possible for more and more private houses to be equipped with their own computers, making the community solution less relevant (Ernberg 1998; Fuchs 1998). Ernberg (1998) explained that this was mainly possible due to the fact that in high-income countries, people, even in remote areas, generally have their own telephone line and can afford to buy a computer and a modem, once they discovered the potential benefits of these. Their level of education and exposure to modern technology is much higher than among people in developing countries and they have better access to training, both in computer literacy and other vocational training courses.

Despite the closure of many telecentres, and due to the reasons explained above and some of the telecentres switching to the commercial model, as opposed to the Swedish social model, these telecentres contributed to developing the market for information and communication services and the capacity of people in remote areas to participate in, and benefit from, the information society. In many developed countries the contribution of the Multipurpose Community Telecentres was mainly to the marketing of the ICT resources and services in remote and rural areas (Fusch 1998).

3.10 ICTs and socio-economic development in rural areas of the developed world: review of empirical studies

Few empirical studies have been conducted on ICTs and socio-economic development in rural areas of the developed world (Ellen 2000; Ramfrez 2000; Ferlander and Duncan 2006). The discussion that follows presents these studies.

An investigation into the harnessing of ICTs for community development in three rural and remote communities in Canada was conducted by Ramfrez (2000). The study was a qualitative research that used grounded theory, soft system methodology, participatory action-research and case study, as the research designs. Data was collected using semi-structured interviews, self-appraisal forms, in-depth interviews and group discussions. The research involved a multiple range of stakeholders involved in rural Ontario ICT projects such as policy-makers, telecentre operators and users, small private telephone companies, federal regulators, provincial ministry representatives, agricultural federations, academics, non-governmental organisations and rural telecommunication networks.

The results of the study indicated that ICTs were transforming the networks that people in rural and remote communities can belong to and, in so doing, they provided a means of reducing isolation. The study found that ICTs created a new environment that was not there before and one which certainly transforms the options that rural and remote communities had at hand. Unlike Ramfrez (2000), who entirely used qualitative methods, the current study used a combination of qualitative and quantitative data-gathering methods to collect information from multiple stakeholders involved in rural ICT initiatives.

An investigation into telecentres and the provision of community-based access to electronic information in everyday life in three rural communities in the United Kingdom was conducted by Ellen (2000). The objectives of the study were to ascertain everyday information seeking and the extent to which electronic information is being used in the everyday life of the people living in rural communities and to examine the use of telecentres and the extent to which these organisations are being used to access electronic information.

Ellen's (2000) study was an exploratory and a qualitative type of research that used sense-making as the theoretical framework for the investigation of everyday information seeking. Data for this study was collected using a sense-making interview schedule which was administered to a total of 47 respondents, who included users, non-users and key actors of telecentres. The study found that topics of respondents' everyday situations which needed information, included consumer issues/concerns, employment, education and schooling, child care, family and personal, financial matters, recreation, crime and safety, health and social security. The study indicated further when used as a tactic for dealing with everyday information needs and seeking, electronic information was an important strategy, but the extent that electronic information was used was limited. This suggested that use of electronic information had not been integrated into everyday information-seeking strategies.

Some of the issues investigated by Ellen (2000) were addressed in the present study. For instance, as in Ellen's (2000) study the present study investigated information needs and seeking patterns in order to determine the extent to which ICT contributed to information needs and seeking patterns. However, Ellen's (2000) study used sense-making procedure to

study information needs, while the current study used critical incident techniques to determine information needs.

A study was conducted by Ferlander and Duncan (2006) to examine two community initiatives designed to encourage digital and social inclusion in disadvantaged areas in Sweden. The assumptions of the study were that there is a risk that marginalised groups in deprived areas may be excluded from the information society, being affected by the 'dual digital divide', that is lack of home access to the internet and lack of public access to ICTs using IT-Cafés. Case study research design, with a combination of qualitative and quantitative data collection methods, was used to carry out the study.

Ferlander and Duncan (2006) study discovered that the provision of home access to the internet, largely failed to achieve its goals. The provision of subsidised public access, the informal face-to-face computer support and training provided by a local resident working in the IT-Cafés was highly appreciated by the residents. The ease with which both virtual and physical meetings can be supported by the IT café mode of access were factors underlying the success of the IT-Café. The paper concluded that access, skills and motivation are prerequisites for a digitally inclusive society. To be on the right side of the (dual) digital divide, it is vital to have physical access to technologies, but also to have the skills and motivation to use them.

As did Ferlander and Duncan (2006), the present study addressed the issue of public access to ICTs in a rural setting, whereby residents are not only provided with the physical access to the technology, but are also trained, assisted and motivated to use the technology. The scope of Ferlander and Duncan's (2006) study was limited to the issue of access only, while in the present study, together with access, other issues such as impact of ICTs on livelihoods, ICT use patterns and policy and regulatory issues are addressed.

3.11 ICT, telecentres and socio-economic development in the rural areas of the developing world

After the initial telecentre projects in developed countries, international and national development agencies recognised the potential of telecentres and are supporting initiatives in

various parts of the globe (Latchem and Walker 2001: viii). As a result, telecentres have been one of the main strategies for providing universal access to telecommunications and information services in the past few years and they are used as a means for bridging the digital divide.

Telecentres in developing countries differ greatly from telecentres in developed countries, on the basis of the purpose of the telecentres and the services offered. Oestmann and Dymond (2001) and Latchem and Walker (2001) indicated that telecentres in most developed countries were clearly geared towards assisting small business development and providing higher-end information technology equipment. Access to basic telecommunications was not the main objective. On the contrary, telecentres in developing countries virtually all had basic telecommunication and office equipment for public use representing the primary demand. The relationship between telecentres and the provision of basic telecom service in developing countries is changing fast, given the mobile phone boom in Africa, as will be discussed in section 7.3.2 of Chapter Seven. In most rural areas, basic telephone (mobile) services are currently provided by local entrepreneurs, who are fiercely competing with telecentres for the provision of telephone services.

Another aspect that differentiates telecentres in developing countries and those in developed countries is the issue of financing and sustainability. Where as in developed countries telecentres were often initially or partially funded by state or provincial governments, as in the case of the Canadian and Australian telecentres, in most developing countries telecentres were initiatives which were commonly financed and supported by external agencies such as ITU, UNDP, IDRC and UNESCO (Latchem and Walker 2001). On the basis of ownership and operating models Latchem and Walker (2001) pointed out that in developing countries almost all telecentres are initiated by development agencies and run by local NGOs.

3.12 Other ICTs service and socio-economic development in rural areas of developing countries

Apart from telecentres, other technologies/ICTs such as mobile phones and community radio, are used for socio-economic development in developing countries.

3.12.1 Mobile phones, access to ICTs and socio-economic development

The mobile phone technology or the cellular system uses base stations to communicate with the mobile phone handsets. The system was first introduced in Japan in the late 1970s, since which time growth has been remarkable (The Economist 1995, cited by Lesame 2005a: 8). The growth of mobile technology became significant in the 1990s. Adonis (1994: 1) stated that in 1994 the issue was no longer whether or not mobile phone would become popular, but how fast they would build a mass consumer market and whether or not they will eventually replace the traditional fixed-wire telephone. In less than a decade mobile phone technology has established itself technically, commercially, socially and in the imagination of people. It has changed the way people think about communication, co-ordination and safety and it has changed the way people behave in public spheres (Ling and Pedersen 2005: v).

In Africa, mobile phone usage has increased dramatically since 2001 and the technology is currently widely used, even in rural areas (Gerber 2005: 35) A report on development in the ICTs and telecommunications sector, including trends and challenges in the world's poorest countries during the period 2001 to 2005, indicated that teledensity has more than doubled in the majority of Least Developed Countries (LDCs). Some of these countries are boosting connectivity by as many as 20 times, thanks to rapid growth in the deployment of mobile technologies (ITU 2006). The report indicated that the mobile sector in LDCs has grown considerably compared with fixed-lines, over the past few years and for many countries the number of mobile subscribers almost doubled in 2005 (ITU 2006).

Kalba (2007) reported that, from a base of 10,000 fixed phones in 2000, the Democratic Republic of Congo gained nearly three million mobile phone subscribers by 2005; Nigeria started with about a million fixed phones, but picked up 19 million mobile ones; Angola,

Ghana, Kenya, Mali, Mauritania, Morocco, Tanzania and Uganda have followed the same path.

Mobile phones have brought about a revolution in Africa. Fixed-line networks are old and decaying and, in many African countries, are not nearly as economically viable as mobile phones have been in the last five years (Lesame 2005b: 227). The phenomenal development of mobile communications on the continent of Africa is one of the most heartening examples of how ICTs can transform economic and social life. Kelly (2005: 40) commented that, after years of being an ICT laggard relative to other developing regions of the world, Africa has been pushed by mobile communications to the forefront in a new information revolution. Kelly (2005: 40) presented the following facts to indicate the phenomenal growth of the mobile phone industry in Africa:

- Africa has added more ICT users in the first few years of the new century than in the previous hundred;
- Africa was the first region in the world in which the number of mobile users overtook the number of fixed-lines (in 2001); and by the start of 2004 there were more than twice as many mobile users as fixed-lines users;
- Africa has had the fastest growing mobile sector of any world region over the past five years and has the highest percentage of mobile users as a percentage of total telephone subscribers.

The mobile telephone is described as an 'ICT' that is bridging the digital divide in Africa and is considered the most significant entry point to the information society for Africans (Heeks 1999; Intelcom Research and Consultancy 2002). Lesame (2005b: 8) explained that mobile phones are not only bridging the digital divide in African countries, but are also performing development functions beyond the expectations of the mobile phone users. In Congo, the first mobile phone became available in 1987 and, since 2003, cheaper handsets and a new mobile phone network has been connecting a country divided by war (Zaijtman 2004: 22). The mobile phone boom improved African countries' economy and gave millions of people much-needed access to communication services. It is predicted that mobile phones will

provide more access to information in the future, as more people gain access to the internet using their mobile phones (Lesame 2005a: 227).

It is clear that mobile phones are playing a very important role in achieving universal access and in extending the availability of ICT services in African and other developing countries. The technology is contributing positively to socio-economic development and sustainable livelihoods in these regions. In Uganda, mobile phones have given rural farmers negotiation power. Ross (2004) stated that the new technology is helping Ugandan farmers establish the real prices their crops can fetch in the market and avoid being cheated by unscrupulous middlemen. In Tanzania, a study by Souter *et al.* (2005) indicated that mobile phones were much more widely used than fixed phones. The study indicated that mobile phones were an important means of communication for emergencies, were extensively used to maintain social networks and were valued as a technology that helps rural people save money.

In Ghana, mobile phones are used to manage existing and embedded social networks, the complex family, business or social connections that constitute resources and obligations (Slater and Kwami 2005). Scott *et al.* (2004) reported that, at present, it is social reasons that drive phone use amongst the poor. "Chatting" and "keeping in touch" constitutes the most common use of phones. Perhaps the most important impact of phone use is an enhanced sense of wellbeing. It saves time, makes business more dynamic and improves financial management, all of which tend to improve household income and reduce risk.

3.12.2 Experiences from the Village Pay Phones (VPPs) project

In Bangladesh, an innovative programme for expanded telecom infrastructure was established by the Grameen Bank (GB) of Bangladesh, the village-based micro-finance organisation. This project leased cellular mobile phones to successful members of the community, especially women. GB calls these phones Village Pay Phones (VPPs). A study by Bayes, von Braun and Akhter (1999), that aimed at evaluating the role of telecommunications within the contexts of rural development and poverty reduction in Bangladesh, observed that the VPPs had a

positive effect for the sellers of services (telephone lessees/owners) and buyers of services (villagers).

VPPs seemed to have perceptible and positive effects on the empowerment and social status of phone-leasing women and their households. For villagers in general, phones offer additional non-economic benefits such as improved law enforcement, more rapid and effective communications during disasters and stronger kinship bonding. It was observed that the project significantly expands access to the vital information input for all segments of the population, reduces inequality and enhances the broad-based, pro-poor orientation of rural development activities (Bayes, von Braun and Akhter 1999).

Reporting on the findings of another study based on the same VPP project in Bangladesh, Islam (2005) revealed that the project had created opportunity for community members to access previously unavailable telephone services, at an affordable price. To the Village Phone Operators the project had a direct benefit to them and studies indicate that these women have escaped from the vicious circle of poverty. They are now considered as a non-poor group. The Village Phone project improved the status of the women operators, their families and the community. Islam (2005) explained that the project had successfully contributed to create a new generation of women entrepreneurs in rural Bangladesh who earn money through selling mobile phone services. The Village Phone partnership model is replicable in any developing country with low teledensity. The model has already been replicated in Rwanda and Uganda (Islam 2005).

In Uganda a study by Stanley (2005) showed that the Village Phone acts as an empowering tool for the women operators. Through the empowerment of female operators the Village Phone helps to alleviate the burdens of poverty, improve access to information, provide an additional source of income and help decrease HIV/AIDS infection rates. The same study revealed that, to the community, the Village Phone is a tool for networking and information exchange which influences the way its operators know and understand the world and it changes the ways communities communicate, access and share information.

In Rwanda the mobile phone is described as more than just a means of communication for rural communities, it is an economic lifeline. The Village Phone Rwanda benefits not only the individual business operator, but the surrounding communities (Afrol News 2006).

3.12.3 Community radio and socio-economic development

In recent years there has been an interest among the telecentre operators to incorporate community radio into telecentre initiatives. The convergence of ICTs, such as the internet, with community radio can provide a powerful support for harnessing and communicating knowledge for development. It can also ensure wider access to information in rural areas. A number of independent community radios, which are not affiliated with a telecentre, have been established in many developing countries. However, research on community radio and its usefulness to the community is still scarce. Buré (2007) pointed out that, although a number of projects exist globally where community radio projects have incorporated telecentres, and *vice versa*, very little research – if any – has been done on the synergies between them.

A community radio station is one that is operated in the community, for the community, about the community and by the community (Nguo *et al.*, 2005: 26; Tabing 2002). Community radio operations are characterised by high levels of community participation, both in management and programme production (Nguo *et al.*, 2005: 26). They differ from national or international radio broadcasters because they feature local news and issues and often include local people in the programmes. They are able to broadcast in the local language. Rural community radio stations often operate on a not-for-profit basis, although they may raise money through advertising (Tabing 2002).

Although radio is not a new phenomenon, community control of programming, content and operation is relatively recent and has been gaining strength throughout the world in recent years, especially in developing countries. As a result, local FM and community radios have attracted the attention of many international development organisations as an optimal resource to be developed in the struggle for democracy, the fight against disease and the preservation of local language and culture (UNFPA 2002).

Nguo *et al.* (2005: 26) pointed out that the main difference between community radio and other forms of radio is that a community radio station focuses on participatory social development, rather than on generating money. It is more concerned with improving the quality of life of the community. Different names have been used at varying times and in varying places to describe community radio. Some of these are rural radio, co-operative radio, participatory radio, free radio, alternative, popular, educational radio, vernacular radios, grassroots or civic radio stations (Waves for Freedom 1995).

Community radio can be located in isolated rural villages, or in the heart of the largest cities of the world. Its signals may reach only a kilometre, cover a whole country or be carried via short wave to other parts of the world. Some stations are owned by not-for-profit groups or by co-operatives, whose members are the listeners themselves. Others are owned by students, universities, municipalities, churches or trade unions (Waves for Freedom 1995). Tabing (2002) explained the community can be territorial or geographical. It can be a township, village, district or island. It can be a group of people with common interests, who are not necessarily living in one defined territory. Community radio can be managed or controlled by one group, by combined groups, or by people such as women, children, farmers, fisher folk, ethnic groups, or senior citizens.

Community radio exists for different purposes. Some are musical, some militant, some are educational and some have mixed purposes. Prakoso (2006) pointed out that community radio is a tool for the people to improve capacity and to get access to resources. By controlling their own radio, they can prepare any programme and activities, according to the needs of the community. Thus the role of community radio becomes strategic in the context of poverty reduction efforts.

To summarise the characteristics of a community radio, Nguo *et al.* (2005: 26) and Tabing (2002) stated that a community radio:

- Serves a recognised community;
- Encourages participatory democracy;

- Offers an opportunity to any member of the community to initiate communication and participate in programme making, management and ownership of the station;
- Uses technology appropriate to the economic capability of the people, not a technology that leads to dependence on external sources;
- Is motivated by community well-being, not commercial considerations; and
- Promotes and improves problem-solving.

Community radio is often greatly appreciated by its audience because of the localised nature of the programming. The community feels involved and can contribute directly to the programme content through letters, phone-ins, Short Message Service (SMS) or by visiting the station. For isolated communities without electricity or telephone it may be the only communication medium that they receive.

Everson (2007) pointed out that community radio is a very people-friendly tool, since no previous skills are required, except to be able to read and write. It is an important and often ignored tool for community engagement and development. The radio is a one-to- many type of media, but when people email or phone in or SMS to a radio station (via telephone or Skype/internet), the communication channels which open up provide rich opportunities for community members to participate in conversations concerning local (or global) issues. It is a way for people to come together on common issues, discuss them and make them public, leading to solutions.

In a study which was conducted at Apac community radio in Northern Uganda, using focus group discussions Nguo *et al.* (2005: 52) reported that radio was the preferred means of getting agricultural information to the community members. Radio was the lead and most viable mode of communication for disseminating agricultural information. Seventy five percent of members of the community listen to that radio. Radio ownership was quite high, with 73.6 % of the 402 study respondents owning a radio.

The respondents in Nguo *et al.* (2005) study said radio is important because there is no electric power in the village to power computers. Radio has helped women communicate, said the radio presenter, through inviting women from various sectors and walks of life to discuss

topics such as domestic violence, gender and health. In this way women gets current information about how to deal with day-to-day issues affecting them at home and at work (Nguo *et al.*, 2005: 52).

Most community radio stations broadcast on the Frequency Modulated (FM) (VHF) waveband and their coverage varies depending upon the equipment being used. FM transmission is often preferred to AM (Amplitude Modulation) because it is less costly to acquire, it is more available in the market, has better signal quality, requires a less complicated antenna system, consumes less electricity and has more available frequencies in the band.

The main disadvantage of the FM transmitter is that the signal travels in a more or less line-of-sight fashion. Therefore FM is most suited to flat terrain, where there are no mountain obstructions and tall buildings, or where an elevated site can be identified for erecting the antenna (Tabing 2002). The regulations concerning the licensing of radio broadcasters vary from country to country and should be understood before radio initiatives are undertaken.

3.13 The digital divide and access to ICTs

The digital divide is a social/political issue referring to the socio-economic gap between communities that have access to computers, the internet and other ICT facilities and those which do not. The digital divide points to a lack of equality in distribution and access between, and within, countries. It also points to other dimensions that underlie this divide, such as between urban and rural location, gender difference, ethnic or race difference, different social or economic class groups and between developed and developing countries. Gurstein (2000: 20) explained that the digital divide refers to the division between those who have access to, and are capable of taking advantage of, the digital sphere and those who, because of financial status, education or skills level, are not. The digital divide is a complex problem that manifests itself in different ways in different countries. It presents practical and policy challenges. Bridges.org (2003) said the digital divide is not a single thing, but a

complicated patchwork of varying levels of ICT access, basic ICT usage and ICT applications among countries and peoples.

As a result of the linkage between communications and socio-economic development, the digital divide has become a political and an economic problem. For this reason, countries and multilateral organisations are trying to solve the problem, often by committing large amounts of resources for development projects that incorporate ICT. To bridge the digital divide efforts have been geared towards increasing access to ICTs. For instance, the DOT Force report (2001) outlined the following strategies for bridging the digital divide: establish developing country and emerging economy e-strategies; enhance human capacity development, knowledge creation and sharing; support local content and applications creation; establish initiatives for ICT inclusion of the least-developed countries and improve connectivity, increase access and lower costs of ICT services.

Providing access to ICTs to disadvantaged communities is currently considered as an important part of the development process. However, access to ICTs should be more than just physical access to the technologies. A study by Burbules and Callister (2000: 21) uses the phrase “thin conception of access”, to refer to the kind of access which only looks at the physical infrastructure and the phrase “thick conception of access”, to refer to the kind of access which focuses on all factors that actually affect who can take full advantage of access in an effective way. Bridges.org (2003) used the term “real access” to ICTs, to expand the concept of access to ICTs and included factors that go beyond providing physical access and making it possible for people to use technology effectively, to improve their lives. Bridges.org (2003) felt that access to technology must mean more than just computers and connections. Bridges.org (2003) set out criteria which are the determining factors in whether or not people have "real access″ to technology. These criteria include:

- Physical access - Is technology available and physically accessible?
- Appropriate technology - What is the appropriate technology according to local conditions and how do people need and want to put technology to use?
- Affordability - Is technology access affordable for people?
- Capacity - Do people understand how to use technology and all its potential uses?
- Relevant content - Is there locally relevant content, especially in terms of language?

- Integration - Does the technology further burden people's lives, or does it integrate into daily routines?
- Socio-cultural factors - Are people limited in their use of technology, based on gender, race or other socio-cultural factors?
- Trust - Do people have confidence in, and understand, the implications of the technology they use, for instance in terms of privacy, security, or cyber crime?
- Legal and regulatory framework - How do laws and regulations affect the use of technology and what changes are needed to create an environment that fosters its use?
- Local economic environment - Is there a local economy that can and will sustain the use of technology?
- Macro-economic environment - Is national economic policy conducive to the widespread use of technology, for example, in terms of transparency, deregulation, investment and labour issues?
- Political will - Is there political will in government to do what is needed to enable the widespread use of technology?

Lewis (2004) discussed necessary versus sufficient conditions for access. He explained that basic ICT technology is essential in addressing issues of universal access. However, it should also mean that people have the means (financial and otherwise) to make use of the technology. To expand the concept of universal access to ICTs, Clement and Shade (2000) invented the “access rainbow” model, which illustrates the multifaceted nature of the concept of access. The "access rainbow" consists of layers representing necessary and sufficient conditions for access to ICTs, particularly computing technology. The model is a seven-layer conceptual framework that can form the basis of efforts to define universal access and to achieve it. This model is summarised in Table 3.1.

Table 3.1: Overview of the access rainbow

Layer	Description
1. Carriage	The facilities that store, service or carry information
2. Devices	The actual physical devices that people operate
3. Tools	The programmes that operate the devices and make connections to services
4. Content Services	The actual information and communications services people find useful
5.Services/Access Provision	The organisations that provide network services and access to users.
6. Literacy/Social Facilitation	The skills people need to take full advantage of ICTs, together with the learning, facilitation and resources to acquire these.
7. Governance	How decisions are made concerning the development and operation of the infrastructure

Source: Adapted from Clement and Shade (2000: 17).

The "access rainbow" model provides an exclusively Western approach to universal access; the model neglects some socio-cultural and political-economic situations of most developing regions of the world, such as Africa. According to Oyedemi (2005: 90), the assumption that simply making available telecommunications devices in semi-urban and rural areas contributes to increased universal access is erroneous. Achieving universal access in Africa should adopt an all-inclusive approach that takes cognisance of various issues peculiar to developing regions such as high illiteracy levels, lack of ICT infrastructure in rural areas and language barriers. Oyedemi (2005: 95) also invented a "wheel model" of universal access, which proposes that apart from the physical provision of technology, other social, economic and cultural issues come into play in achieving universal access in Africa.

Britz (2004: 192) pointed out that the divide between the information rich and the information poor is not limited to lack of access to modern ICTs alone. It is a much more complex phenomenon including issues such as cultural and language diversity, levels of education and the ability/inability to access and benefit from information. In addition Britz (2004: 193) stressed that **"**it is a moral imperative that the continuous construction of the growing information society be regulated by a set of universal principles based on social justice".

Verhoest (2000: 607) stated that "it is useful to distinguish physical access from dispositional access, that is the cultural, intellectual and practical dispositions required to function in an information-rich environment". Various other studies, such as those by Clement and Shade (2000), Gurstein (2000) and Warschauer (2003), have also acknowledged the crucial importance of a broader conceptualisation of access than just access at a physical level.

3.13.1 Universal service and universal access policies

The term "universal service" was first introduced by the American telecommunication company AT&T in 1907. Facing competition, AT&T devised a universal service goal as a company policy of creating an integrated network that was universal, interdependent, interconnected and intercommunicating and that would enable all telephone users to communicate with one another (Verhoest 2000). The terms universal service and universal access were later propounded and accepted in academic and policy management milieux. They are now used as an egalitarian and socially responsive policy of providing telecommunication services to all (Oyedemi 2005: 91). The notion of communications universality, as "universal access to basic communications for all", was endorsed by the UN General Assembly in December 1997. The ITU's World Telecommunications Development Report of 1998 pointed out that:

> "We live in a world where technology that theoretically provides access from any place on the Earth is available. Universal access is now not an engineering or supply-side problem but rather a regulatory and policy challenge" (ITU 1998).

The terms universal service and universal access provide a wide range of differing meanings, crafted to suit individual experiences of different countries. Universal service implies availability of connection to ICT by every home and household in a country. Universal service is a practical policy objective in many industrialised countries, but it is not economically feasible in most developing countries, where universal access is the more practical goal (Intven and Tetrault 2002; Oyedemi 2005; 92). This is especially the case when ICTs are considered more broadly than telephony and include the use of the internet. Universal access indicates a situation in which every person has a reasonable means of access

to publicly available telephones. Universal access may be provided through pay telephones, community telecentres and similar means (Intven and Tetrault 2002).

Many countries have set different universal access goals and therefore the term accessible means different things to different countries and regions and different things in different contexts within each country. There is no fixed and uniform definition of universal service (ITU 2002). Different countries have different targets for universal service.

- In Tanzania the government has committed itself to the development of the telecommunication services by placing the telephone within 'easy reach' of everybody (URT 1997a). The government set a target of rural teledensity of 1 telephone line per village by 2020 and the overall teledensity of 6 by the year 2020 (URT 1997a);
- In Kenya, universal access means a phone within walking distance;
- Lesotho sees universal access as having a public telephone within ten kilometres of a community;
- In Togo, universal access means a telephone within a five-kilometre radius by 2010;
- Zambia sees universal access as telephone booths in public places (such as schools and clinics), countrywide; and
- For Mozambique, universal access means a public telephone within a distance of less than five kilometres, with at least one public telephone in each of the country's district centres (ITU 1998).

3.13.2 Mechanisms to achieve universal access

According to Oyedemi (2005), policy-makers and national governments in Africa have a serious challenge to develop appropriate policy that enhances the universal diffusion of, and access to, ICT services, by adopting a holistic approach that takes cognisance of the social, cultural and political needs of the community.

National governments can play a fundamental role in creating an environment that will foster the use of technology and encourage national and international investment in ICT infrastructure, development and a skilled workforce. Government action is also important in spreading the benefits of technology throughout society and governments have the power and

mandate to balance the needs of their citizens for long-term economic growth and social prosperity.

Depending on circumstances, national governments have to make various decisions in implementing universal access policies. Decisions have to be made about which services should be supported in respect of universality. Should universality policies target primarily fixed-line telephony? Should they extend to support the extension of mobile telephony? At what stage should internet access, broadband and multimedia be included? Governments need to decide which groupings within the society should be targeted in the promotion of universal service and universal access. Should universality policies be designed primarily on the basis of geography (designed to benefit remote rural communities, rather than urban ones), or on the basis of income (designed to benefit the poor), or on the basis of some other disadvantaged category (such as the disabled, or women)?

Different approaches can be used to promote universal access and universal service. Some of these approaches include the adoption of market-based reforms in the telecommunication sector, instilling universality obligations to telecommunication operators and the establishment of a universal service fund, or sometimes called a rural telecommunication development fund.

In the case of Tanzania, the telecommunication regulatory authority has instilled universality obligation into the telecommunication operators, especially the fixed-line ones. The government has recently enacted a bill for the establishment of the universality fund. All licenced ICT operators in the country will contribute to the fund and the money will be used for infrastructural development in rural areas and the establishment of telecentres.

3.14 Policy and regulatory issues related to universal access: review of empirical study

Few studies have been conducted with regard to policy and regulatory issues as they relate to universal access in Tanzania. Esselaar, Stavrou and O'Riordan (2004) studied VSAT systems in Tanzania, Nigeria and Algeria. The emphasis of their study was on policy and regulatory perspective of the VSAT systems, as well as the economic and usage perspective. Though not directly related to the current study, the policy and regulatory perspective of the Tanzanian

case study in the Esselaar, Stavrou and O'Riordan (2004) research was found relevant to the current study, as its findings depicted the Tanzanian ICT policy and regulatory environment, in general.

The Tanzanian case study involved a survey of 14 internet cafés, where 297 internet café users completed a questionnaire in Dar es Salaam and a further 196 in the rural town of Mtwara. The study involved qualitative interviews with industry experts, ISPs, industry stakeholders (such as telecom companies); the regulatory authority (TCRA), Small, Micro and Medium Enterprises and owners/managers of internet cafés.

The findings of the study were that the issue across the Tanzanian ICT industry was the lack of government implementation. This was especially the case in terms of the universal access policy and the implementation of the ICT policy itself. The regulatory body (TCRA) was accused of seeing itself as primarily the generator of revenue for the government, rather than as developing the sector and being a proactive body that was intent on creating value in the ICT sector.

The internet users' survey showed that most internet users were young. The average age was 29 in Dar es Salaam. The distribution of the internet café consumers was highly skewed in favour of scholars and those involved in full-time employment, which can be related to the financial capability and/or appreciation of the different technology services availed to these consumers.

Esselaar, Stavrou and O'Riordan (2004) made the following recommendations:

- Review the royalty fee system that the operators normally pay to the regulator;
- For the TCRA to play an active role in the co-ordination of different initiatives to provide access to connectivity and prevent duplication of initiatives and ineffectual use of financial resources;
- To increase the ICT human capital of the TCRA and thereby enable it to effectively fulfil its mandate to monitor investment, availability and distribution of infrastructure and cost of service.

3.15 ICTs for socio-economic development in rural areas in developing countries: review of empirical studies

Various empirical studies have been conducted to investigate the role of ICTs for socio-economic development in rural areas in developing countries (Benjamin 2000; Etta and Parvyn-Wamahiu 2003; Kanungo 2004; Parkinson 2005; Van Belle and Trusler 2005; Ulrich 2004; Soriano 2007). The discussion that follows presents these studies.

A study by Benjamin (2001c) noted that, while there is much talk about telecentres, there are not many successful telecentres in developing countries. The study involved the evaluation of the Gaseleka telecentre in the Northern Province in South Africa indicated that ICTs can only offer useful services if there is relevant information and communication (Benjamin 2001c: 83). In this telecentre it was found out that, despite valiant efforts, the telecentre had not really been able to serve as an information centre, because most of the information of interest to local people is already known and is delivered by word of mouth.

Etta and Parvyn-Wamahiu (2003) studied the link between ICTs and development in Africa, using the experience of community telecentres. The study was conducted in Mali, Mozambique, Senegal, South Africa and Uganda, using the same methodology. The primary sample for the study consisted of a total of 36 telecentres and internet cafés, which were treated as cases. Five of these telecentres were in Uganda, three in Mali, two in Mozambique, six in South Africa and twenty in Senegal. The survey samples included users and potential users of the telecentres.

The study used qualitative and quantitative methods to collect data from actual and potential telecentre users in the communities. Data collection methods used included focus group discussions, naturalistic or realistic observations, in-depth case histories and key-informant interviews, user interviews, document analysis and photo documentation.

The findings of Etta and Parvyn-Wamahiu (2003) revealed that telecentres have brought a large number of people in disadvantaged and under-served rural communities into direct contact with modern ICTs. However, only a small percentage of the total population was

using the telecentre facilities. The study pointed out that age, sex, education and literacy levels, and socio-economic status, influenced telecentre use. Fewer women than men used telecentre services in all of the countries and facilities.

In terms of services offered, the study found that telecentres in all five countries offered similar services: photocopying, telephony, training in computer hardware and software, internet access and word processing. Facsimile transmission, document design, processing, printing and email services were also available. The huge popularity of the telephone is undisputed. In terms of the relevance of the telecentre services the study found that the main reason for using the telecentres was to obtain or send information and, for the most part, the purpose of this information was social: for contacting friends and family, for preparing documents for social events (such as weddings and funerals) and for personal entertainment. Professional and economic motives, such as seeking economic and agricultural information, came a distant second on the list of reasons for telecentre use.

Etta and Parvyn-Wamahiu (2003) said that the telecentre is to information what the school is to education and the hospital or clinic to health and well-being. Therefore support should be given to start, maintain and run telecentres, because they perform a primary development function for information and education, which is considered a basic and important human right. The study recommends that national governments should create enabling environments through policies and policy instruments for the growth of telecentres.

Similar research methodologies (a combination of qualitative and quantitative methods) have been used by the Etta and Parvyn-Wamahiu's (2003) study and the present study. Unlike the present study, the Etta and Parvyn-Wamahiu (2003) study was planned and conducted as an evaluative research to contribute towards illuminating the relationship between ICTs and development on the continent. Etta and Parvyn-Wamahiu (2003) evaluated the performance of telecentres. The present study examines the link between ICTs service provided by the telecentres and other ICTs services available in rural communities and the livelihoods of the people living in the rural areas, rather than evaluating the performance of the telecentres themselves.

Kanungo (2004) studied the emancipatory role of rural information systems. The study was conducted within the information village project that covers 19 villages of rural India. Data was collected using in-depth interviews with the project staff and village volunteers. Additional documentary evidence was based on project plans and reports, interim studies and articles from the press. The findings of the study indicated that social processes can form a viable basis for providing sustainability to information communications technology (ICT) initiatives in rural regions. Kanungo (2004) revealed that social processes can be leveraged to accord viability to ICT setups in rural settings.

In his recommendations, Kanungo (2004) pointed out that information systems in rural areas face many obstacles. The value added by these systems needs to be assessed in terms of their contribution to social capital, in addition to economic value added. The current study also looked at the contribution of ICTs to the social capital, in addition to the two more capital assets of human capital and financial capital.

Ulrich (2004) conducted a study of poverty reduction through access to information and communication technologies in rural areas of China. A survey of five Chinese provinces involved 1,235 households in 32 towns and villages of the ICT projects. Data was collected using a questionnaire.

The study involved the wide definition of ICTs which include mobile phones, television and other ICTs services available in the areas, to assess the impact of the ICT on the lives of the people. Ulrich (2004) showed that respondents with higher levels of income tended to find the information centres more useful and placed a higher financial value on the services and visited the centres more frequently. Ulrich (2004) recommended that ICT projects could do better in their outreach to the poor and to women in villages. As with the current study, Ulrich's work adopted a wide definition of ICTs, which included not only ICT services provided by the telecentres but also mobile phones.

An investigation of telecentres, access and development in Uganda and South Africa was conducted by Parkinson (2005), who drew on the experiences of telecentres in South Africa and Uganda at the policy and community levels. Parkinson's (2005) survey involved a total of 62 access centres, which included telecentres, internet cafés, computer-based secretarial and printing services, public phone shops, local radio stations and training centres. Parkinson conducted semi-structured interviews with management of the access centres and a survey of 370 households. In the two countries the national case studies were augmented by primary and secondary research on national policy, regulation, ICT-related service providers, national government programmes and NGOs.

Some of the key findings of Parkinson's (2005) study were the following: telecentres are generally not adequate by themselves to build local demand. Because access to ICTs is difficult to achieve in rural areas through market means it should be carefully harmonised with larger rural development strategies. Universal access for telephone requires strategies different from those needed for other ICTs (especially computer-related), since the former usually enjoys immediate demand, while the latter does not. Affordability is a major barrier to accessibility in both countries. One of the most important impact of ICT use appears to be the maintenance of links between geographically dispersed family members.
Parkinson (2005) recommended that those with the task of setting up centres need to first assess the local situation; telephone access and use are issues best considered separately from internet access and use, especially since GSM cellular networks have contributed broadly to the spread of the telephone; Regulators should consider encouraging or supporting preferential telecommunication service rates (and possibly electricity rates) to agencies, whether public or private, which provide public access. Parkinson further recommended that assumptions about how people will choose to use ICTs should be avoided; any policy that depends on people's interaction with ICTs should be based on evidence. As with Parkinson's study, the current study looked at the community level, as well as at the policy and regulatory issues that relate to rural ICT access and use.

Van Belle and Trusler (2005: 154) investigated implementation issues of a multipurpose community centre in a rural development situation in the Dwars River Valley (DRV) of the

Western Cape, South Africa. They concluded that ICTs can indeed be of practical use in a variety of situations. Their work involved in-depth case study analysis of a single rural telecentre located in the Western Cape Province of South Africa. Data was collected using background documentation and in-depth interviews with the telecentre stakeholders.

The results of Van Belle and Trusler study indicated that telecentres can have positive contributions, particularly in supporting entrepreneurial development projects. Van Belle and Trusler (2005: 154) noted that, under the right conditions, ICTs worked well enough and participants, even those with relatively little previous computer experience, found it easy to learn to use computers. Significant training was required, but once this was completed, participants were able to produce project plans, budgets, brochures, websites and other artefacts

The main objective of Van Belle and Trusler's (2005) work was to gain a much deeper and richer understanding of the implementation issues of a multipurpose community centre in a rural development situation. The emphasis of the current study was on the services provided by the telecentre and how those services contribute to livelihood strategies of the people in the communities surrounding the telecentres. The present study, as with Van Belle and Trusler's (2005) work, adopted a case study approach. However, Van Belle and Trusler (2005) investigated a single case (single, rural telecentre), while the present study involved four cases.

Applying the rural livelihoods' framework of analysis, Soriano (2007) explored the link between ICTs and rural poverty reduction, by analysing the role of community telecentres in enhancing the livelihood strategies of rural poor households. The population under investigation involved 90 respondents from two villages in Wu'an, China, which were treated as case studies. Data was collected using desk research, field interviews, surveys and focus group discussions.

Soriano explored the direct and indirect role that telecentres played in facilitating the poor's access to more livelihoods resources and assets and in influencing the adoption of diverse

livelihoods strategies. Soriano showed that, while the intensity of the changes experienced cannot support the claims about the transformative role of telecentre on the rural poor, the changes have some positive implications on certain aspects of rural poverty and livelihoods capital assets. In terms of financial capital, telecentre services led to better earnings and more production. In human capital, the benefits accrued include e-literacy integration and knowledge-sharing while in social capital it led to the creation of venues for community integration and knowledge-sharing.

Some of the issues addressed by Soriano (2007) were also addressed in the present study. For instance, as with Soriano's (2007) study, the current work used the sustainable livelihoods framework of analysis to explore the link between ICTs and rural livelihoods. However, unlike the present study, Sorianos's (2007) research only dealt with the link between ICT services provided by the telecentres and livelihoods. The present study went a step further, to investigate the link between livelihoods and other ICTs services such as mobile phones.

3.16 ICT for socio-economic development in the rural areas of Tanzania: review of empirical studies

Various empirical studies have been conducted to investigate the role of ICTs for socio-economic development in rural areas of Tanzania (Goodman 2005; McNamara 2008; Mercer 2005; Myhr and Nordström 2006; Nielinger 2003; Samuel, Shah and Hadingham 2005; Souter *et al.,* 2005). The discussion that follows presents these studies.

Nielinger (2003) conducted a case study research in three rural districts with telecentres. These were Kasulu, Magu, and Sengerema. The aim of the research was to investigate rural ICT utilisation in these districts. Data was collected using background interviews and user surveys. A total of 173 interviews were conducted, with ICT users randomly selected in all three locations.

Nielinger found that rural ICT utilisation faces many challenges. Some of these are widespread poverty, lack of skills and scarce resources. Nielinger pointed out that building the necessary infrastructure and covering the running costs, especially of connectivity, puts a much higher burden on rural communities than on ICT users in the urban economic centres.

Nielinger found that there was a general lack of guidance with regard to the opportunities provided by the internet. Nielinger concluded that ambitious claims on the role of ICTs are rarely in line with reality. The basic dynamics of rural ICT utilisation is often misconceived.

In another study, which was carried out in and around three internet cafés in Dar es Salaam, Tanzania, and one Multipurpose Community Telecentre (MCT) in Sengerema, Mercer (2005: 1) took issue with the ICT for development discourse and suggested that the geographies of inclusion and exclusion created by the internet are more complex. Mercer revealed that for Tanzania's information and communication technologies (ICT) elites, the internet will shape the population into knowledge and market-seeking, productive citizens, stimulating national growth. However, for internet café users and non-users, the internet has become a marker of modernity, a way for people to indicate their relative level of development. Internet use is currently dominated by leisure, communication and information relating to global popular culture. Mercer demonstrated that development interventions, which turn the symptoms of poverty into technical problems to be solved with technological responses, are inherently flawed, since the failure to deal with the causes of poverty means that the majority of Tanzanians continue to be excluded from the 'information society'.

Mercer's (2005) findings indicated that the experiences with the use of ICTs and services provided by telecentres vary from one community to another. The findings show that not much has been done to investigate specifically the extent to which ICTs impact various aspects of the livelihoods of the people. The population in Mercer's study involved a total of 279 customers from the three internet cafés in Dar es Salaam and 265 customers from the internet café at the Sengerema Multipurpose Community Telecentre all of whom completed open-ended questionnaires. In Sengerema, semi-structured interviews with customers and focus group discussions with non-customers were held and 299 town residents were interviewed to contextualise the questionnaire responses.

Unlike the present study, which mainly deals with rural areas, Mercer's study in 2005 involved populations from urban as well as rural areas. The definition of ICT services by Mercer was limited to internet services only. In the present study, other ICT services provided

by telecentres, such as computer training, community radio services, marketing information services and mobile phone services were also included.

Another study on socio-economic impacts of mobile communications on households, rural communities and small businesses in South Africa, Tanzania and Egypt was conducted by Samuel, Shah and Hadingham (2005). The study was a survey research, where data was collected using face-to-face interviews with 252 respondents from 10 rural communities and 140 small businesses in South Africa. The study involved 11 rural communities, with a total of 223 respondents and nine small businesses in Tanzania. In Egypt 150 small businesses were surveyed. Some of the objectives the research sought to address were: factors that influence ownership, use and non-use of mobile phones, uses of mobile phones and the social and economic impact of mobile phones on communities and small businesses in Africa.
The results of Samuel, Shah and Hadingham (2005) study indicated a very high awareness of the potential to use mobile phones for communication and very high perceived accessibility, even in very poor rural communities. The results were that 97 percent of the Tanzanian sample stated that they could access a mobile phone if they wished to, whereas only 28 percent could access a landline somewhere in the community.

The impacts of using mobile phones, as found in Samuel, Shah and Hadingham study, were social in nature, while others concerned employment or business. The social impacts were very important, both in South Africa and Tanzania. They include greater contact and improved relationships with family and friends. This was one of the most significant benefits identified by the surveys. Other benefits highlighted include reduced travel costs and help in job searches. In Tanzania, a high proportion of respondents (57 percent) felt that a major impact from mobile phones was faster and improved communication, as the majority of the people had no access to any other kind of a phone before the advent of mobile phones.

Lack of access to electricity was mentioned as a potential barrier to the uptake of the mobile phones and other technologies. In the case of Tanzania, many communities had limited or no access to electric power. Samuel, Shah and Hadingham (2005) found that respondents with electricity are more likely to own a mobile phone and those without electricity are more likely to borrow someone else's. Unlike Samuel, Shah and Hadingham's (2005) study which

researched the socio-economic impacts of mobile communications on households, rural communities and small businesses, the present study investigated mobile phones as well as ICTs services provided by the telecentres and studied their socio-economic impacts on rural communities.

In another survey, Goodman (2005) probed the link between mobile phone ownership and use and social capital in rural South Africa and Tanzania. The survey used a questionnaire, which was administered to 252 respondents from 10 rural communities in South Africa and 223 respondents from 10 rural communities in Tanzania. In both surveys, the mobile phone was the communications tool that most people had easy access to. In addition, results from both surveys showed a high degree of sharing mobile phones, suggesting that the devices are a social amenity as well as a communications tool. These two phenomena of the mobile phone device are important contributors of social capital.

Goodman's study in 2005 found that there are some links between social capital and mobile phone ownership and use in rural communities in South Africa and Tanzania. Mobiles were being used intensively in both surveys for contact with close friends and family. The study concluded that, within the parameters of the two surveys, mobiles were facilitating participation in social networks, helping to maintain both strong and weak links, including participation in community group activity. They were thus allowing people to invest in and draw on social capital.

As in Goodman's (2005) study, the present work looked at the link between mobile phones and social capital in rural areas. Goodman (2005) study was limited to that aspect only (social capital), while the present study investigated the link between other capital assets and mobile phones, as well as other ICT service provided by telecentres.

An investigation into the economic impact of telecommunications on rural livelihoods and poverty reduction was conducted by Souter *et al*. (2005). The study was conducted in rural communities in three developing countries, India, Mozambique and Tanzania, using field research methodology. An extensive questionnaire survey was administered to adult household heads and other senior household members in selected rural communities in these

countries, concerning their use of telephony and other ICTs. In each country, three research locations were chosen and the research was undertaken in thirty villages clustered around these locations.

In each location, about 250 adults, mostly heads of households, were interviewed at length about their household circumstances, communications requirements and behaviour, their use of telephones and their attitudes towards telephones. In addition, 100 and 150 small-scale business people were interviewed at each location. Seven hundred and forty five respondents were interviewed in India, 813 in Mozambique and 734 in Tanzania. In the case of Tanzania the three locations were Sengerema district, Hai district and Njombe district. The research used the sustainable rural livelihoods as a framework for the analysis of the impact of telecommunications on livelihoods.

The research showed that there was a consistent pattern of telephone behaviour in the three countries. Telephones were considered very important for use in emergencies and extensively used to maintain social networks, especially contact within the family. It was valued more for saving money than for earning money. The telephone was valued more by richer and better-educated people than by the poorer, less-educated or more marginal members of society, especially where financial value was concerned. It was considered unimportant for information- gathering.

Souter *et al.* (2005) revealed that face-to-face communications were the most important communications medium for specific information on issues such as farming, business and education. Hardly anyone in the sample populations had yet used the internet. On the impact of the telephone on livelihoods, the findings showed that the impact of the telephone on social capital is considerable. The telephone was important and considered to have high value, in all three countries, for social networking, particularly within the family. The impact of the telephone on economic activities was mixed.

Souter *et al.* (2005) found that the telephone was considered to have value by a high proportion of users when it comes to saving money (for example, by substituting for transport

or postal costs), but it was not considered to have value by most users for earning income. The telephone was found to be having minimum impact on information-gathering. Face-to-face communications were found to be the overwhelming medium of communications for information-gathering.

Souter *et al.* (2005) said where telephones were valuable in improving livelihoods they were benefiting higher status groups most and the most marginalised groups least. Souter *et al.* (2005) predicted that the rapid growth in telephone ownership is likely to increase the number of beneficiaries considerably over the next few years, but the most marginalised could be left behind.

As with the current study, Souter *et al*. (2005) used the sustainable livelihoods framework to study the link between ICTs and rural livelihoods. However, unlike the present study, that used a wider definition of ICTs, the emphasis of Souter *et al.* (2005) was on telecommunication only. The study used quantitative methods while the present study used qualitative methods.

Myhr and Nordström (2006) conducted a study on livelihood changes enabled by mobile phones, using Tanzanian fishermen as a case study. Data for the study was collected by interviews with fishing boat captains in Dar es Salaam and Mwanza. The purpose was to investigate what impact mobile phone use had on the livelihood indicators which include empowerment, opportunity and vulnerability to risk. Thirteen semi-structured interviews were conducted with captains of commercial fishing boats at the two locations.

Myhr and Nordström (2006) showed that increased access to information enabled by mobile phones brought positive effects to all livelihoods indicators. Mobile phone use empowered the fishermen, both through increased bargaining power and increased control over external events. Mobile phones provided increased knowledge concerning market opportunities and a possibility to work more efficiently. Mobile phones gave fishermen the possibility to take measures to decrease the risks they are exposed to, such as emergencies at sea. The negative effects of the use of mobile phones were found to be negligible.

Myhr and Nordström (2006) concluded that positive effects to livelihoods indicators enabled by mobile phones are most likely not isolated to Tanzanian fishermen. Communication through mobile phones can bring similar advantages to other groups that had earlier been excluded from the communication system. As with the study of Souter *et al*. (2005), that of Myhr and Nordström (2006) is based on mobile phones, to study the link between ICTs and livelihoods.

Bjørn and Stein (2007) investigated regional aspects of internet use in Tanzania, in order to understand the extent of the digital divide within Tanzania. The study sought to determine if there were differences in quantity or quality of public internet access points and their use and users between rural and urban areas. The survey was performed in rural, semi-urban and central regions of the country. Seven internet cafés and 63 respondents from three rural regions, Iringa, Mbeya, and Songea, were involved. From the urban regions the study involved six internet cafés and 41 respondents from Morogoro and 12 internet cafés and 161 respondents from Dar es Salaam. A question was used to collect data from the five sites.

The findings showed that internet users in internet cafés were surprisingly similar in urban and rural areas. However, some small differences between urban and rural internet users existed, in that the users are becoming more "elite" in the rural regions, where access was scarce. Rural users tended to be younger and better educated and they were willing to spend relatively more money on internet use. They were also, to some degree, using the internet for more "instrumental" purposes, such as research and information seeking. Bjørn and Stein (2007) pointed out another, more obvious difference, "gender digital divide", showing that the share of female users is considerably lower in rural regions.

In a study by McNamara (2008), the survey questionnaire was given to a sample of 181 individuals and key informants in rural communities, from nine villages located in three districts in Tanzania, These were Bagamoyo, Njombe and Moshi Rural. The questionnaires were complemented by focus group discussions with districts officers and planning officers and round-table discussions with key stakeholders from government, civil society organisations, private sector and academia, as well as development partners and practitioners.

McNamara's (2008) findings were that ICTs commonly used by the rural poor in the selected districts were radio, mobile phone and television. Very few people used internet, email and fax. The study pointed out that ICTs contributed to improving rural livelihoods through improved business (17%), increased access to education (3%), ease of communication (50%) and increased access to key information (30%). McNamara (2008) pointed out challenges for effective utilisation to ICT, which included resistance from users because of culture, traditions and economic hardship, which restrict people from using ICTs. The rural community believes that ICTs have brought some negative impacts to society, including distortion of culture and an increase in violence and crime.

McNamara (2008) recommended that the government should invest in ICT infrastructure in rural areas and provide incentives to individuals willing to invest in ICTs in rural areas, through private-public partnerships. The government should control programmes broadcast on television and radio, to preserve the national culture. The cost of radio batteries should also be controlled. The study recommended that the price of mobile phone devices and air-time vouchers should be reduced to allow more rural communities to access them.

3.17 Information need and seeking patterns

This section provides the definition for the terms information, information need and information-seeking patterns

3.17.1 Information

Information can be defined as ideas, facts, imaginative works of the mind and data of value potentially useful in decision-making, question answering or problem-solving (Kaniki 1989: 191). Information can be any difference one experiences, in one's environment or within one's self. It is any aspect that is noticed in the pattern of reality (Case 2002: 5).

3.17.2 The information need

The information need concept has been defined by a number of authors. Said (2003: 10) defined information need as the requirement for facts, data or ideas for a certain purpose Kaniki (1989: 191) defined information need as the state of lack of a desirable requisite or

commodity (namely information) necessary to deal with a situation, as an individual (or as a member of a given community) sees fit. Case (2002: 5) said information need is recognition that personal knowledge is inadequate to satisfy a goal that needs to be achieved. Maepa (2000: 11) explained that the concept of information need does not only presuppose the lack of information; it goes beyond this by linking the need with the use of that information to deal with a difficult situation, or to solve a problem. He stated that information need is therefore always situation specific.

The present study defined information need as a situation that arises when an individual or member of the community encounters a problem that can be resolved through some information. Consumption of information results from a need for information. This means that when a person has identified his/her information needs, then he/she is in a position to seek for information to meet those needs.

3.17.3 Information-seeking patterns

Information-seeking can be defined as a conscious effort to acquire information in response to a need or gap in knowledge (Case 2002: 5). It is a process in which an individual goes about looking for information and it is a complimentary process to information need (Ikoja-Odongo and Ocholla 2004). Maepa (2000: 13) defined information-seeking patterns as the process of identifying, choosing and locating the likely information provider that will satisfy the information needs of the individual. It is concerned with who needs what kind of information, for what reasons and how that information is found by the user, evaluated and eventually used. Information seeking follows the identification of an information need.

The concept of information behaviour goes hand in hand with information-seeking and it encompasses information-seeking as well as the totality of other unintentional or passive behaviour (such as glimpsing or encountering information), as well as purposive behaviours that do not involve seeking, such as actively avoiding information (Case 2002: 5). Ikoja-Odongo and Ocholla (2004) said information-seeking behaviour is a process that requires an information-seeker to apply personal knowledge and skills, or what might be called “personal information infrastructures”, such as a person’s cognitive abilities, his/her knowledge skills in

relation to the problem/task domain, knowledge and skills in general, knowledge and skills specific to a system and knowledge and skills regarding information-seeking.

Wilson (1981) explained that information-seeking behaviour results from the recognition of a need, perceived by the user, who, as a consequence, makes demands upon formal systems such as libraries, information centres, online services or expert persons, in order to satisfy the perceived need. The present study considered information-seeking as a process by which individual or members of the communities surrounding telecentres look for information that bridges the gap between their information needs and their information sources. The study will use a Critical Incident Technique (CIT), to determine the information needs of the people living in communities where telecentres are located. The critical incident technique is explained in detail in section 4.7.1.1.2 of Chapter Four of the present study.

3.17. 4 The concept of information-seeking patterns and telecentre operations

The ultimate aim of any information service, including telecentres, is to meet the information needs of its community. Soergel (1976: 257) and Dalton (1992) pointed out that the ultimate objective of an information system (or services) is not subjective satisfaction, as expressed by the users, but improved task performance, problem-solving and decision- making. The best way to assess the ultimate value of an information system and the information it provides is by measuring the uses that are made of information and the subsequent impact of that information on users' scientific and technical activities. According to (Kaniki 1995: 11), information needs therefore manifest themselves in the form of tasks of users or potential users.

Stilwell (2002: 67) stated that in daily life every person is faced with decision-making situations or problem-solving situations or questions. These may be abstract, cognitive or real. They may be mental or physical, or both. However, because of one's experience or acquired knowledge, which is an accumulation of information with specific application, some of these situational problems, decision-making processes or questions become 'normal'. In other words, a person would either have developed ready solutions to such 'normal problems', or have ideas on how to solve or seek assistance or solutions to such 'problems.'

In several situations or instances in which a person or groups of persons encounter problems, decision-making and/or question-answering situations they do not have ready 'solutions' for them: In other words, the person or community experiences or envelops a gap, or is in a state of lacking some commodity, which must be filled (Kaniki 2001: 191). Kaniki (2001: 192) explained, "this state of uncertainty requires information as a stimulus to create a change in one's level or degree of uncertainty". In order to meet such information need, the level and nature of uncertainty needs to be assessed. The appropriateness of the information provided in response to a need depends on the extent to which it resolves the given need and here the seeker is the judge. A need for information can be recognised or unrecognised, expressed or unexpressed. Some information needs may be recognised by the information-seeker him/herself or by the information expert in engaging with the seeker. The former and the latter may have to "work together towards 'disentangling' and establishing the actual need" (Kaniki 2001: 192).

Large sums of money have been invested in provision of access to ICTs for the public. Access to ICTs is growing, as the number of community-based ICT initiatives is mushrooming in developing countries. The question is to what extent is this access being used and for what purposes this access is being used. How is this access used in information-seeking and what particular information needs lend themselves to using information provided by ICTs. These are some of the question addressed by the present study. Information needs assessment is critical in developing and running relevant information services (Kaniki 1995: 9). Many of the information services which are based on new technologies such as telecentres are sometimes under-utilised, or are not in line with the information needs of the communities they serve. The study of information- seeking behaviour of the informal sector entrepreneurs in Uganda using CIT revealed that modern/exotic models of information transfer based on textual media and ICT exhibit less impact on the entrepreneurs' information needs and use because of poverty, illiteracy and poor information infrastructure (Ikoja-Odongo and Ocholla 2004: 54).

3.18 Summary

This chapter provided information on the purpose and the importance of the literature review. The chapter discussed different models that explain the relationship between ICTs and socio-economic development and that which provided the theoretical framework of the study. The literature review covered the origin and the way in which knowledge has been built up in the field of ICTs for socio-economic development and identified important trends, the available debates and controversies in the field.

Thereafter the literature review was organised thematically, by using themes and sub- topics related to the study. Previous studies on ICTs and socio-economic development were also reviewed. Previous studies facilitated the identification of gaps in the literature. Reviews of previous studies revealed that different communities have different experiences with the use of ICTs. Therefore, relevant research in a specific environment is needed to bridge the gap between the expectations of what ICTs can do to people living in rural areas and the reality of how actually ICTs are being used in practice.

CHAPTER FOUR

RESEARCH METHODOLOGY

4.0 Introduction

The purpose of this study was to investigate how, and for what purposes, ICTs are used by people in the selected rural areas of Tanzania and to determine the impact that ICTs have had on the various aspects of their livelihoods. To achieve this purpose, empirical data on access and use of ICTs by people living in rural areas where telecentres are located was collected, the rationale was to fill the gap between the expectations of what ICTs can do for poor people and the reality of how these technologies have actually been used in these areas. In order to answer the research questions posed in the study, and attain the objectives stated in Chapter One, case study research design, using both quantitative and qualitative data collection methods was, employed.

Chapter Four deals with the methodology that was adopted in conducting the study. The chapter describes, and justifies where necessary, the methods and procedures used in the present study. The chapter includes sections on the research design that was used to carry out the study, as well as the description of the study population and the sampling procedures that were used. The chapter covers the methods of data collection and the data collection instruments that were used in the study. The chapter discusses validity and reliability issues applied to the study, ethical considerations and procedures for data analysis. Finally, the chapter discusses problems encountered during data collection and presents an evaluation of the methodology used to conduct the study.

4.1 Research design

Research design is a plan or a blueprint of how a researcher intends to conduct a study (Babbie and Mouton 2001: 74). It is the general blueprint for the collection, measurement and analysis of data, with the central goal of solving the research problem. It includes the outline of what the researcher will do, from writing the hypothesis and its operational implications, to the final analysis of data (Creswell and Clark 2007: 58). According to Kothari (2004: 14), a good research design must yield maximum information and provide an opportunity for

considering many different aspects of the problem. Mikkelsen (1995: 22) pointed out that the nature and the context of the study determine a research design since a good research design for a certain study might be inappropriate for another study. Cohen, Manion and Morrison (2000: 91) stated that the research design is governed by the notion of "fitness" for purpose and therefore the purpose of the research determines the methodology and the design of the research. This study employed a case study research design, with both quantitative and qualitative data collection methods.

4.2 Qualitative versus quantitative research methods

Research methodologies revolve around two major approaches, namely quantitative and qualitative (Cohen, Manion and Morrison 2007: 165; Creswell 1994: 1; Denzin and Lincoln 2005: 10-12). Quantitative methods measure a phenomenon using numbers in conjunction with statistical procedures, to process data and summarise results (Creswell 1994: 2; Payne and Payne 2004: 180). Qualitative research methods are an approach to research that produces a detailed and a non-quantitative account of small groups, seeking to interpret the meaning that people make of their lives in a natural setting (Creswell 1994: 2; Payne and Payne 2004: 175).

The qualitative methodology is mainly concerned with how ordinary people observe and describe their lives. Qualitative researchers rarely try to simplify what is observed, but instead they try to portray the issue they are studying in its multifaceted form (Creswell 1994; Leedy and Ormrod 2001). To further differentiate qualitative and quantitative research, Denzin and Lincoln (2005: 12) explained that, while quantitative researchers believe that rich description of the social world are valuable, quantitative researchers are normally less concerned with such details.

The assumptions, purposes and methods of the two research approaches or paradigms also differ. The qualitative paradigm can use an interpretative, constructivist or naturalistic approach (Creswell 1994: 4; Oliver 2004: 28). The major concern of this paradigm is to understand the world as it is and see the world as an emergent social process (Denzin and Lincoln 2005: 10). On the ontological issues of what is real, qualitative researchers believe

that the only reality is that constructed by the individual involved in the research situation. Thus multiple realities exist in any situation (Creswell 1994: 4). On epistemological issues, that is, the relationship of the researcher to what is researched, the qualitative researcher holds a non-positivist epistemology and believes that the researcher should interact with that being researched (Cohen, Manion and Morrison 2000: 6; Creswell 1994: 4-7; Denzin and Lincoln 2005: 10-12; Oliver 2004 28-30).

In contrast, the quantitative research paradigm can be normative, traditional, experimental, or empiricist (Oliver 2004: 28). Quantitative researchers approach their subject matter from an objectivist point of view and seek to provide essentially rational explanations on the assumption that social interactions form an integrated set of relationships best understood by inductive procedures (Creswell 1994: 4-7; Oliver 2004: 28-30). On the ontological issues, quantitative researchers view reality as objective and independent of the researcher (Creswell 1994: 4). On the epistemological issues, quantitative researchers hold a positivist epistemology and believe that the researcher should remain distant and independent from what is being researched (Creswell 1994: 4-7; Cohen, Manion and Morrison 2000: 6; Denzin and Lincoln 2005: 10-12; Oliver 2004 28-30).

The ontological and epistemological positions of the two research paradigms in turn influence the choice of the methodology and the data collection methods employed in a research project. This is because research exists in a logical continuum starting with ontology and epistemology and ending with instrumentation and data collection (Cohen, Manion and Morrison 2000: 1; Oliver 2004: 29). Therefore a positivist epistemology mainly implies the use of survey methods and questionnaires for data collection (Creswell 1994: 117; Denzin and Lincoln 2005: 12). The non-positivist epistemology implies the use of methods such as ethnography, grounded theory, participant observation, documentary methods, field works and the use of an unstructured interview for data collection (Denzin and Lincoln 2005: 12; Oliver 2004: 29; Payne and Payne 2004: 175).

4.3 Justification for combined methods

The present study used the case study design, with a combination of both qualitative and quantitative methods of data collection. The epistemological and ontological positions of qualitative research are generally different from those of quantitative research (Cohen, Manion and Morrison 2000: 6; Creswell 1994: 4-7; Denzin and Lincoln 2005: 10-12; Oliver 2004: 28-30). However, the two paradigms are not fundamentally opposed to each other. As such, they can be used in conjunction or triangulated to fit the question under study (Cohen, Manion and Morrison 2000: 45, 112; Ngulube 2003: 198). Bryman (1988: 172) pointed out that the differences between the two approaches are technical rather than epistemological, meaning that, in practice, researchers can "mix and match" methods, according to what best fit the questions under study.

Differences between the two paradigms in approach and purpose do not mean that qualitative research and quantitative research are mutually exclusive. To emphasise this point, Gorard and Taylor (2004: 150-2) said the distinction between quantitative and qualitative work on which the notion of paradigms is based, is in any case, exaggerated. It is somehow impractical to sustain an argument that all parts of all methods, including data collection, carry epistemological or ontological commitments. They argued that there are certain shared assumptions underlying all types of research, regardless of the methods used and that there are no pure ontological or epistemological divisions in practice.

In line with the combined paradigm approach in research, Gorard and Taylor (2004: 1) stressed that both paradigms have strengths and that even greater strength may come from their appropriate combination. Creswell and Clark (2007: 5) explained that the use of quantitative and qualitative approaches in combination provides a better understanding of the research problem than either approach alone. Mixed method research provides strength that offset the weaknesses of both quantitative and qualitative research. The use of both paradigms in this research was carefully designed, so as to minimise the expense, the time consumption and the length of the entire exercise, as advised by Creswell (1994: 7). This study adopted the dominant-less-dominant model of Creswell (2003: 136), in this case qualitative paradigm was more dominant. The combined methods research was important for the current study as it

helped to fit together the insights provided by qualitative and quantitative research in answering the research quaestions. The combined methods was also used for triangulation purposes (see. Section 4.9.3.2 in chapter Four)

4.4 Case study research

A case study design, with a combination of qualitative and quantitative methods of data collection, was used to carry out the investigation for this study. Bryman (2004: 49) explained that exponents of the case study design often favour qualitative methods, such as participant observation and un-structured interviewing, because these methods are viewed as particularly helpful in the generation of an intensive, detailed examination of a case. However, case studies are frequently sites for the employment of both quantitative and qualitative research.

This study was carried out based on the combined paradigm approach, discussed in section 4.3. The use of combined methods in case study research is supported by Rowley (2002: 18), who pointed out that case study research uses multiple data sources and can be based on any mix of quantitative and qualitative approaches. Denzin and Lincoln (2005: 460) and Pickard (2007: 85) noted that case studies can be both qualitative and quantitative.

A case study is defined as an empirical enquiry that investigates a contemporary phenomenon within its real life context, especially when the boundaries between phenomenon and context are not clearly evident and in which multiple sources of evidence are used (Yin 1994: 13; Yin 2004: 100; Pickard 2007: 85). It is a method used to study a social phenomenon through a thorough analysis of an individual case, which may be a person, group, community, society, or any other unit of social life (Kumar 1996: 99). In a case study enquiry, the researcher gathers in-depth data on the research questions relative to a programme or an event (the case), for the purpose of learning more about an unknown or poorly understood situation (Bryman, 2004: 26; Creswell 1994: 12; Leedy and Ormrod 2001: 114; Pickard 2007: 86).

Kumar (1996: 99) ascertained that a case study provides an opportunity for the intensive analysis of many specific details often overlooked by other methods. This perspective was important for the present study, as it helped to understand the interaction of people with the

telecentres and the way in which the media technologies were used to support the range of social relationships and processes within which telecentres operated (Burke and Kirk 2001; Tacchi, Slater and Lewis 2003). It helped to find out how ICTs fit into the communities' knowledge and communication systems, which Kiondo (1998: 101) referred to as indigenous communication systems.

Commenting on the number of cases to be included in a case study, Leedy and Ormrod (2001: 114), Willig (2001: 74), Yin (2004: 59), Yin (2003: 5) and Yin (1994) pointed out that case study research can include a single case or multiple cases. This study was a multi-case study, also referred to as multi-site study (Audet and d'Amboise 2001), multi- case, or collective case study (Cohen, Manion and Morrison 2000: 183; Denzin and Lincoln 2005: 445). A case study is suitable when the research being conducted is an in-depth study of less than fifty cases (Mouton 2001: 149). This is appropriate because this research consists of four cases only. Yin (1994) sees evidence gathered from multiple case studies as being "more robust" than from a single case study and this provides a basis for generalisation.

Case study design was considered appropriate for this research because it gave the researcher an opportunity to gather in-depth data of the cases and on communication processes taking places in communities where telecentres are located. In this research, cases were telecentres and the communities around them. The study investigated how, and for what purposes, ICT services provided by telecentres were utilised by people in communities surrounding them and their impact on the livelihoods of the people living in those areas. The study investigated utilisation of other non-telecentre based ICTs services such as mobile phones. Utilisation of mobile phones was investigated due to the fact that in recent years there has been a tremendous growth of mobile phone industry in Tanzania and, in most cases, mobile phones are considered important ICTs in rural areas (Hancock 2005).

Commenting on the use of theory in case study approaches, Willig (2001: 76) stated that the role of theory in case study is two-fold. Case studies can be designed to test an existing theory or they can constitute the starting point for the generation of a new theory. In the first instance a case study can be preceded by an initial theory, which directs the researcher's attention to what is to be examined, within the framework of the study (Hammel 1993: 44; Yin 1994: 29).

Yin (1994: 28) recommended that the designing of the case study should embody a theory of what is being studied, in order for the researcher to be clear and explicit about the theoretical bases. A case study can be used to test existing theories or to clarify or extend such theories, for instance by looking at deviant or extreme cases (Willig 2001: 76).

A case study has implications for theory development or generation of a new theory (Willig 2001: 76). When used to generate a new theory, case studies can facilitate conceptual refinement of emerging theoretical formulations or they can lead to the discovery of new insight and interpretations (Willig 2001: 76). Therefore case studies can facilitate theory building. The detailed exploration of a particular case can generate insight into social processes which, in turn, give rise to theoretical formulation.

For the purpose of this study, theory was used as a theoretical pattern and a perspective to guide the study. This explains the reason why the theoretical framework for this study was initially provided at the beginning of the study, to guide the researcher to what was to be examined. The results of this study helped to clarify, modify and extend theories which were used to guide the study.

4.5 Study population

A study population can be defined as the entire collection of cases or units about which the researcher wishes to draw conclusions (Kothari 2004: 55, 153). A study population can be defined as the specified aggregation of the elements in the study (Babbie 2002). One of the major steps in formulating a research design is to define the population according to the objectives of the study. Ngulube (2005: 133) emphasised that it is important for the investigator to carefully and completely define the population before collecting samples.

This study involved four categories of units of analysis. These were all the telecentres currently available in Tanzania (there are 19 telecentres at the moment), individuals in communities surrounding these telecentres, which involved both users and non-users of the telecentres, managers of the selected telecentres and personnel responsible for telecentre projects in institutions which are currently actively involved in introducing rural telecentres in

Tanzania. These institutions are the Tanzanian Commission for Science and Technology (COSTECH), the Tanzania Communication and Regulatory Authority (TCRA) and the ministry responsible for ICTs development in Tanzania, which was at the time of this work called Ministry of Infrastructure Development. The following section explains the methods and procedures that were applied in the selection of the sample that was studied.

4.6 Sampling procedures

A sample is a model of the population or a subset of the population that is used to gain information about the entire population. It is a small collection of units, from a much larger collection or population, which is studied to enable the researcher to make more accurate generalisations about the larger group (Mugenda and Mugenda 2003: 10; Neuman 2006: 219). Sampling is therefore defined as the process of obtaining information about an entire population by examining only part of it (Kothari 2004: 153; Mugenda and Mugenda 2003: 10).

Sampling can also be defined as the process of selecting units, such as people and organisations, from the population of interest (Trochim 2001: 41). To emphasise the importance of sampling, Cohen, Manion and Morrison (2000: 92) pointed out that the quality of a piece of research not only stands or falls by the appropriateness of methodology and instrumentation, but also by the suitability of the sampling strategy that was adopted.

There are two main methods of sampling used in research. These are probability sampling, also known as random sampling, and non-probability sampling, which is sometimes called purposive sampling (Cohen, Manion and Morrison 2007: 110; Mugenda and Mugenda 2003: 44; Neuman 2006: 219; Welman, Kruger and Mitchell 2005: 56). In probability sampling, a reasonable number of subjects, objects or cases that represent the target population are selected. In this kind of sampling a researcher can determine the probability that any element or member of the population will be included in the sample (Mugenda and Mugenda 2003: 45).

Probability sampling seeks representativeness of the wider population and is mainly used in quantitative research (Cohen, Manion and Morrison 2007: 110). Examples of probability sampling techniques are simple random sampling, stratified random sampling, systematic sampling and cluster sampling (Cohen, Manion and Morrison 2007: 110; Mugenda and Mugenda 2003: 44; Neuman 2006: 219; Welman, Kruger and Mitchell 2005: 56).

Non-probability sampling seeks mainly to represent only a particular group, or a particular named section, of a wider group (Cohen, Manion and Morrison 2007: 110). Therefore, in non-probability sampling the researcher cannot specify the probability that any element or member of the population will be included in the sample (Mugenda and Mugenda 2003: 45). Examples of non-probability sampling techniques are quota sampling, purposive or judgemental sampling, snowball sampling, accidental or incidental sampling, self-selection sampling and convenience sampling (Cohen, Manion and Morrison 2007: 110; Mugenda and Mugenda 2003: 44; Neuman 2006: 219; Welman, Kruger and Mitchell 2005: 56). Non-probability sampling is used mainly in qualitative research.

The present study used non-probability sampling. Non-probability sampling is used when a sampling population cannot be precisely defined, or when a list of the sampling population is unavailable (Frankfort-Nachmias and Nachmias 1996: 184), as was the case in this study, in which two forms of non-probability sampling were used. These were quota sampling and purposive sampling.

This study comprised four categories of units of analysis and therefore purposive sampling procedures involved selection of the telecentres to be included in the study. Sampling entailed selection of the respondents from a large population of users and non-users in communities surrounding the telecentres. In this case quota sampling was used. Finally, purposive sampling was used to select other categories of respondents, such as managers of the telecentres and personnel responsible for telecentre projects in institutions actively involved in introducing telecentres in Tanzania. Sampling was aplied in all the four categories of units of analysis in the present study to ensure that the appropriate population is obtained from the entire population of the units of analysis. This enabled to researcher to obtained appropriate data for the research.

4.6.1. Sampling of telecentres (cases) to be involved in the study

Telecentres involved in this study were selected based on the purposive criteria outlined in Table 4.1.

Table 4.1 Criteria for the selection of the telecentres

Criteria	Condition used
Location	The telecentres involved in this study were those located in rural and peri-urban areas. They were mainly villages or district headquarters
Service offered	Telecentres involved were those offering a full range of ICT services beyond telephony such as internet, email, photocopying, computer training, faxing and scanning of documents
Telecentre maturity	The telecentres selected were those which had been in operation for a period of at least one year, to justify some kind of successful evaluation
Mode of operation	The selected telecentres had various modes of ownership/operation, in order to see the performance of these telecentres on the basis of various modes of operation, for instance privately owned, NGO owned or community owned.

Similar criteria were also used by Ellen (2000), Etta and Parvyn-Wamahiu (2003: 11) and Maepa and Mphahlele (2004).

All the telecentres in Tanzania listed in section 2.6 of Chapter Two were subjected to scrutiny using these criteria as a framework for selection. A thorough desktop research of all the telecentres was made between March and July 2006. An email communication was established with managers of two of the telecentres (FADECO and Magu telecentre), to clarify some of the information provided on their websites. The researcher visited three telecentres that is, Bagamoyo, Dakawa and Kilosa, in January 2006, to get first-hand information on how these telecentres worked. All the information collected was carefully studied to establish which telecentres were to be included in the study.

It was concluded that, out of the nineteen telecentres, four met all the criteria and that they collectively would make a suitable sample for the study. The researcher was satisfied that these would yield relevant information relating to the aims and objectives of the study. The selected four telecentres were Magu (CROMABU) telecentre, Sengerema Multipurpose Community Telecentre, FADECO telecentre and Ngara telecentre. A short description of each of these telecentres is provided in the next subsection.

Other telecentres were omitted because they did not meet all the criteria set out in this study, as listed in Table 4.1. For instance, Mwanza City/University of Dar es Salaam Community Telecentre and Dodoma Environmental Network were omitted because they were not located within the rural areas. Several telecentres, most notably Bagamoyo, Lugoba, Hanang, Dakawa and Kilosa, had fewer services than were required for sampling in this study. Some did not have internet connections, whilst others did not have computer-training services. Eight telecentres were left out because they did not have telephone or internet services. These were Bagamoyo telecentre, Lugoba telecentre, Hanang telecentre, Dakawa telecentre, Kilosa telecentre, Mpwapwa Multipurpose Telecentre, Kinampanda Multipurpose Telecentre and Mtwara telecentre. By and large, the selected four telecentres were located in the rural areas; they were more than one year old and reliably operational within the period; they had internet, fax and telephone connections.

The One Village Rural Community Telecentre, in Arumeru district, Arusha region, and the Arid Lands Information Network (ALIN-EA), in Shinyanga district, were omitted because they were relatively new initiatives, less than a year old. Kasulu telecentre was omitted because it had the same mode of operation as that of Ngara telecentre. One of these had to be left out for the purposes of representation in the study. They were all located within the refugee camps. They both received funding from ITU, UNESCO and UNHCR, with COSTECH as a local executing agency.

4.6.1.1 Magu telecentre

Magu telecentre is located in Magu district, Mwanza region. The facility is located at the district headquarters. The operations of this facility started in 2001. The telecentre is operated

by the Crop Marketing Bureau (CROMABU), in collaboration with the Tanzania Chamber of Commerce, Industry and Agriculture (TCCIA) and the International Institute for Communication and Development (IICD) (CROMABU2006; Menda 2004). The focus of Magu telecentre is the agro-information systems aimed at enabling producers to access market opportunities and farm inputs such as fertilisers, seeds, production techniques and packaging. The facility has an internet connection and offers a range of other ICT-related services to the community. Other services offered were computer training services, photocopying, printing, faxing and scanning of documents (CROMABU 2006).

4.6.1.2 Sengerema Multipurpose Community Telecentre

The Sengerema Multipurpose Community Telecentre is located in Sengerema district, Mwanza region. It is a development-oriented, multipurpose community telecentre, which was established in 2001 within the ITU, IDRC and UNESCO framework. The three organisations constitute the international partners. At the national level there are COSTECH, TCRA, TTCL, Tanzania Library Association, TCCIA, and Tanzania National Commission for UNESCO. Sengerema district council is the partner at the local level.

The telecentre focuses on ICTs and ICT-related services as its core business. The Sengerema Multipurpose Community Telecentre provides ICT equipment, connectivity and training to the community (Sengerema MCT project 2003). The centre has also developed a variety of ICT-related services designed to benefit the community as a whole. This is one of the most developed telecentres in Tanzania and it offers a range of ICT services, including computer training to the community (Sengerema MCT project 2003). The telecentre started its operations in 2000.

4.6.1.3 Family Alliance for Development and Co-operation (FADECO) telecentre

FADECO is a non-governmental organisation located in Karagwe district, Bukoba region. FADECO has a well-equipped information resource centre which was upgraded into a telecentre in November 2004. FADECO acquired internet connectivity with assistance from the Regional Agricultural Information Network (RAIN) (FADECO 2007a). The telecentre is stocked with offline electronic resources such as CD-ROM libraries and audio-visual materials. It offers a range of services, including public access to the internet and computer

training. FADECO telecentre is managed by an executive board, which is composed of a chairman, vice-chairman, a secretary, treasurer and two committee members. Supervision of the daily activities of FADECO is done by the project manager (FADECO 2007b). The focus of FADECO telecentre is agriculture and post-harvest food preservation techniques.

4.6.1.4 Ngara telecentre

Ngara telecentre is located in the remote northwest district of Ngara, Kagera region, close to the borders of Rwanda and Burundi. This telecentre was established in 2003. Ngara is a district with a number of camps hosting refugees who fled civil wars in Burundi and the 1994 genocide in Rwanda. Ngara telecentre was established as a unique project that offers an opportunity to bring synergy between the communication and information needs of the local communities, the relief organisations working to help refugees and the refugees seeking to communicate with their families and friends (ITU 2004b; Swopnet 2007).

The telecentre is funded by the International Telecommunication Union (ITU), in partnership with the United Nations High Commission for Refugees (UNHCR) and the United Nations Educational, Scientific and Cultural Organisation (UNESCO). At the local level, the executing agency for the project is the Tanzania Commission for Science and Technology (COSTECH) (ITU 2004b). Ngara telecentre offers a range of ICT services, including public access to the internet, computer training services, photocopying, printing and faxing services.

4.6.2 Sampling of respondents in communities surrounding telecentres

Quota sampling techniques were used to sample respondents involved in this study. Quota sampling is a non-probability sampling technique, in which the researcher first identifies the strata/quotas and their proportions as they are represented in the population. Thereafter convenience or judgment sampling is used to select the required number of subjects (see section 4.9.6) from each stratum (Cohen, Manion and Morrison 2000: 103; Leedy and Ormrod 2005: 219; Neuman 2006: 220; Trochim 2006; Welman, Kruger and Mitchell 2005: 68).

Quota sampling can be proportional or non-proportional (Trochim 2001: 57). In proportional quota sampling the respondents are selected non-randomly according to some fixed quota,

whereby the researcher needs to represent the major characteristics of the population by sampling a proportional amount of each (Trochim 2001: 57). In non-proportional quota sampling the researcher specifies the minimum number of units to be sampled in each quota/stratum. In this case the researcher is not concerned with having numbers that match the proportions in the population. However, an effort is made to ensure that the sample will include even small groups in the population (Trochim 2001: 57).

Non-proportional quota sampling was considered useful in the present case, because it was difficult to glean information on the exact number of people involved in each economic activity performed in these areas. A list that indicated the number of people involved in these activities and their proportions was not available.

For the purpose of this study, communities within the administrative areas surrounding the telecentre (in this case a ward)[12] were stratified into different strata, based on the economic activities of the people in the community. The economic activities were farming, livestock keeping, small-scale business, fishing and small-scale mining activities. The strata were formed based on what the dominant economic activities were, in each community. Convenience or judgment sampling was applied to select representatives from each stratum. Sampling was done from the households, shops/business centres and from the premises of the telecentres, so as to ensure that both users and non-users of the telecentres were included.

4.6.3 Strata and the economic activities in the research areas

All the telecentres were situated in wards which were located at the district headquarters. These areas are characterised by people engaged in various economic activities, including small-scale business, whereas in areas far from the district headquarters most people are practising small-scale agriculture. Strata were formed by people who are practising various economic activities such as farming, tree nurseries growing, horticultural products cultivation, livestock-keeping, small-scale business, fishing and artistic works. Most of these activities are

[12] All the telecentres included in this study are located in district headquarters. In the Tanzanian context a district is divided into divisions, divisions are divided into wards and wards are divided into villages. On average, a ward will have about three to five villages.

performed on a small-scale, which is sometimes called a ‘microenterprise’ and they constitute what is generally termed the “informal sector”.

The informal sector is defined as the non-structured sector that has emerged in urban and rural areas, mostly in developing countries, as a result of the incapacity of the modern sector to absorb new entrants (ILO 1972). In the case of Tanzania, Kent and Mushi (1995) stated that the informal sector is interpreted as individuals or groups of people engaged in legitimate enterprises (either subsistence or small-scale), some of whom may be regulated by the state, such as in the form of co-operatives, but the vast majority are considered to be operating outside the legal regulations of the state. The informal sector consists of a heterogeneous set of activities, many of them in trade and services. In the rural areas the informal sector operators may be small-scale farmers, agriculturists engaged in off-season non-farm activities, or full-time providers of products and services to the countryside (Demeke and Amha 2000).

The characteristics of the informal sector are ease of entry, reliance on indigenous resources, family ownership of enterprises, small-scale operation, labour-intensive and adapted technology, skills acquired outside the formal school system and an unregulated and competitive market (Demeke and Amha 2000).

Sampling for this study was done in such a way that the informal sector constitutes the majority of the respondents involved. Sampling of the respondents involved a small percentage of people from the formal sector and students, so as to get a holistic picture of the users of the telecentre services in these areas. This small percentage of the respondents from the formal sector constituted a stratum which was termed as ‘others’ in the interview protocol.

4.6.3.1 Sampling of the respondents at Sengerema district

Administratively, Sengerema district is divided into five divisions, 25 wards, 123 registered villages and 758 hamlets. The five divisions are Sengerema, Nyamachenche, Katunguru, Uchosa and Kahunda (Sengerema District Council 2006). The Sengerema Multipurpose Community Telecentre is located at Sengerema division, which is further divided into the five wards of Sengerema, Sima, Busisi, Tabaruka and Buzilasoga. The study was based in the

Sengerema ward and respondents were selected from two villages in the Sengerema ward. These included Migombani and Buziluga. (See section 4.6.2). Fifty three respondents were selected from this district (See section 4.9.6).

4.6.3.2 Sampling of the respondents at Magu district

Administratively, Magu district is divided into six divisions, 27 wards, 124 villages and 765 hamlets. The six divisions are Ndagalu, Itumbili, Kahangara, Sanjo, Kivukoni and Busega (Magu District Council 2006). The study was based at Itumbili division, which is divided into the five wards of Magu, Lubugu, Nyigogo, Sukuma and Mwamabanza. Magu telecentre is located in Magu ward. Magu telecentre has outreach projects and farmers groups in two other wards, namely Lubugu and Nyigogo. Therefore respondents in this study were selected from two wards, Magu and Lubugu. In the Magu ward respondents were selected from Nyalikungu village, while in the Lubugu ward respondents were selected from Bubinza and Ilunga Villages. (See section 4.6.2). Sixty respondents were selected from this district (See section 4.9.6).

4.6.3.3 Sampling of the respondents at Karagwe district

Karagwe district consists of four divisions. These include Kaisho/Murongo, Bugene/Nyaishozi, Kituntu/Mabira and Nyabiyonza (Karagwe District Council 2006). The FADECO telecentre is located in the Bugene/Nyaishozi division, which is divided into three wards, namely Kayanga, Bugene and Nyaishozi. The study was based in Kayanga ward. Respondents were selected from Kayanga and Omulushaka villages. (See section 4.6.2). Forty respondents were selected from this district (See section 4.9.6).

4.6.3.4 Sampling of the respondents at Ngara district

Ngara district is divided into four divisions. These are Murusagamba, Rulenge, Kanazi and Nyamiaga (Ngara District Council 2006). The Ngara telecentre has three stations located in three different places in the district. These stations are Ngara station, which serves the Ngara local community, K-9 station, which serves staff of various relief organisations for refugees in Ngara, and Lukole Refugee Camp station, which serves the refugees. Respondents for this

study came from Ngara station only. This is because the two locations had no internet connection during the time of this study and very few people were using the services. The K-9 station was actually closed during the time of this research. Ngara station is located at Nyamiaga division, which is divided into five wards. These are Nyamiaga, Kibimba, Ngara, Rusumo and Ntobeye. The study was based in Ngara ward. Respondents for this study came from two villages, namely Nakatunga and Mubinyange. (See section 4.6.2). Fifty respondents were selected from this district (See section 4.9.6).

4.6.4 Sampling of other categories of respondents

Purposive sampling was applied in the selection of other categories of respondents. These were managers of telecentres and one manager was selected from each telecentre. The other categories of respondents were personnel responsible for telecentre projects at COSTECH, TCRA and the ministry responsible for communication in Tanzania (the then MoID). One respondent was selected from each institution.

Babbie (2004: 183) defined purposive sampling as a type of non-probability sampling, in which the researcher selects the units to be observed on the basis of his/her own judgment about which ones will be the most useful or representative. Welman, Kruger and Mitchell (2005: 69) warned that in purposive sampling the researchers rely on their experience, ingenuity and/or previous research findings to obtain units of analysis, in such a manner that the sample they obtain may be regarded as being representative of the relevant population. Cohen, Manion and Morrison (2000: 114) said that in purposive sampling researchers hand-pick the cases to be included in the sample, on the basis of their judgment of their typicality, or possession of the particular characteristic being sought.

Neuman (2006: 222) pointed out that in purposive sampling the researcher uses a wide range of methods to locate all possible cases of a highly specific and difficult-to-reach population. Purposive sampling is also called judgment sampling, in which the researcher decides the purpose they want informants (or communities) to save and they go out to find some (Bernard 2000: 176; Welman, Kruger and Mitchell 2005: 69). Patton (2002: 230) pointed out that the logic and power of purposive sampling lie in selecting information-rich cases for study in

depth. The information-rich cases are the cases from which one can learn a great deal about issues of central importance to the purpose of the inquiry. In this study, purposively sampled respondents were selected on the basis of their ability to provide information relevant to the study.

4.7 Methods of data collection

Data for this study was collected using structured interviews, semi-structured interviews, focus group discussions and observation techniques. The application of more than one instrument in data collection was vital to provide checks and balances with regard to shortfalls characterised by each of the data-gathering instruments. The section below provides information on data collection methods used in the study and the category of population the methods were applied to.

4.7.1 Interviews

A research interview involves verbal administration of the interview guide. Interviews are defined as face-to-face encounters between the researcher and the respondents, for the specific purpose of obtaining research-relevant information (Kothari 2004: 97; Mugenda and Mugenda 2003: 83; Neuman 2006: 305). The interview method is considered to be one of the most common and effective way of understanding our fellow human beings (Denzin and Lincoln 2005: 698). The purpose of interviewing has been defined by Patton (2002: 341) as to find out what is on someone's mind. People are interviewed to discover things that cannot be directly observed. Interviewing involves the gathering of data through direct verbal interaction between individuals. In this sense it differs from a questionnaire, where the respondents are required to record in some way their responses to set questions (Cohen, Manion and Morrison 2000: 269).

The major attractions of the interview method of data collection, when compared to other methods, as pointed out by Burton (2000: 323), Cohen, Manion and Morrison (2000: 269), Hannabuss (1996: 22-3) and Robson (2002: 272), are the following:

- Interviews have a larger response rate than questionnaires, because respondents become more involved and hence more motivated;

- Interviews enable more to be said about the research than is usually stated in a covering letter to a questionnaire;
- They are better than questionnaires for handling more difficult and open-ended questions;
- In conducting interviews the interviewer is able to answer questions concerning the purpose of the interview and any misunderstandings experienced by the interviewee;
- Interviews are much more suitable for people with limited literacy than a questionnaire;
- Interviews have the advantage of providing responses in the form in which respondents think and use language;
- Interviews have been characterised as the most effective way of enlisting the co-operation of most populations; and
- The quality of data obtained through interviews is usually superior to that obtained by other methods.

Interviews are normally flexible and they provide an interviewer with the opportunity to probe and ask follow-up questions. In so doing, more information and a greater depth can be obtained from an interview than from a questionnaire (Kothari 1990: 98). For these reasons interviews were used in this study. However, interviews tend to be more expensive than questionnaires in terms of time and money because, contrary to an interview, a questionnaire can be mailed.

Interviews used for research purposes can be divided into various different types. According to Cohen, Manion and Morrison (2000: 270), the number of types of interviews given is frequently a function of the source one reads. Kvale (1996: 126-7) cautioned that interviews differ in the openness of their purpose, their degree of structure, the extent to which they are exploratory or hypothesis-testing, whether they seek description or interpretation and whether they are largely cognitive-focused or emotion-focused. Cohen, Manion and Morrison (2000: 270), Denzin and Lincoln (2005: 698), Leedy and Ormrod (2005: 146), Robson (2002: 268) explained that the major difference between interviews lies in the degree of structure in the interview which, to some extent, links to the 'depth' of response sought.

On the basis of the degree of the structure, interviews can be categorised as being structured (where questions are pre-set) or unstructured, where there are no set questions and where the participant, rather than the interviewer, may even set the agenda. Interviews can be semi-structured, which provides a half-way house between the highly rigorous and inflexible fully structured interview and the open-ended and more subjective unstructured interview (Denzin and Lincoln 2005: 698; Ratcliffe 2002: 21).

According to Hannabuss (1996: 23), each of these approaches to interviewing has strengths and weaknesses and each may be more or less suitable for particular types and areas of research. For instance, the highly-structured approach may be good for eliciting information about large numbers of people using a particular service, or for determining people's choice of a consumer product, while unstructured interviews tend to be preferable when complex, personal or sensitive issues are being probed. Unstructured interviews provide more breadth than do the other types due to their qualitative nature. These interviews are also known as the qualitative, open-ended, or in-depth (ethnographic) interviews (Denzin and Lincoln 2005: 705; Robson 2002: 270).

A non-structured interview is an open situation, with greater flexibility and freedom. Although the research purpose governs the questions to be asked, their content, sequence, and wording, they are entirely in the hands of the interviewer (Cohen, Manion and Morrison 2000: 273; Leedy and Ormrod 2005: 146; Robson 2002: 270). In this kind of interview, the interviewer has a general area of interest and concern, but lets the conversation develop within this area. The types of interviews that were used to collect data for this study included structured interviews and semi-structured interviews.

4.7.1.1 Structured interviews

In structured interviews, the interviewer asks all the respondents the same series of pre-established questions, with a limited set of response categories (Denzin and Lincoln 2005: 702; Robson 2002: 270). Structured interviews involve asking the same questions in the same way to a large number of respondents. It is the kind of interview in which the content and procedures are organised in advance. In this case, the sequence and wording of the questions

are determined by means of a schedule and the interviewer is left with little freedom to make modifications (Cohen, Manion and Morrison 2000: 273; Ratcliffe 2002: 20). A standard set of guidelines is normally employed (Denzin and Lincoln 2005: 702; Hannabuss 1996: 23). The aim of the structured interview is to capture precise data of a codable nature, to explain conduct and performance within the pre-established categories.

For the purpose of this study, structured interviews were conducted with users and non-users of the telecentres. Interviews with users and non-users of the telecentres aimed at answering the following questions:

- To what extent do people in the selected rural areas have access to ICTs?
- What type of information do people need for their day-to-day livelihoods?
- To what extent are ICTs used to facilitate the availability of such information?
- For what purposes are the ICTs used by people in these areas?
- How important are the ICTs during emergencies, natural disasters or seasonal variations in prices of their agricultural products and food supply?

4.7.1.1.1 The structured interview protocol for users and non-users of the telecentres

A structured interview protocol with both closed and open-ended questions was developed to be used for interviewing users and non-users of the telecentres. The interview protocol was structured to solicit information at the household and at the individual level (see Appendix 4.1).

The same interview protocol was designed to solicit data from users and non-users of the telecentres. Users were defined as those who benefited directly from the telecentre, such as those who have a direct contact with the telecentre and those who had visited the telecentre in search of a particular service or information. Non-users were defined as those people who had never visited the telecentre or used any services offered by the telecentre. It includes those who had no direct contact with the telecentre. This category includes the indirect beneficiary of telecentre services, such as those who are community radio listeners only.

In the case of the telephone, users were defined as those who had access of some kind to a telephone, either through ownership, borrowing or sharing with family and friends, or through call centres. The non-users were defined as those who are not using and have never used any kind of phone. This category included those people who have no access of any kind to a phone.

The design of the interview protocol was based on the specific objectives of the study, which brought about the research questions for the study. The interview protocol for users and non-users of ICT services in these areas was structured in the following order:

Sections 1 - 3

Sections 1-3 of the interview protocol allowed the researcher to gather background information of the respondents. The study sought to describe the characteristics of the respondents in three categories, namely personal information, household data and economic status. The personal information consisted of variables such as age, gender, level of education and occupation. Household data includes the relationship of the respondents to the head of the household, the number of people living in the household and the extent to which the household depends on support from family members living elsewhere. The economic status concerned the individual or the household. It consisted of issues such as the principal source of income for the household, housing quality and characteristics and ownership of land, livestock and other things.

The background information was important because it provided data on the basic characteristics of the respondents, such as age, literacy level and occupation. It provided information on the level of wealth or prosperity of the respondents and their access to various capital assets. This information is important for the sustainable livelihoods assessments. The information shed light on access and use pattern of ICTs by the respondents.

Section 4

This section allowed the researcher to gather information on access to ICTs by the respondents. Since the study was conducted in areas where physical access to ICTs was

available in the form of telecentres (and most likely coverage of mobile phones/GSM networks), other criteria for accessibility that is 'real access' to ICTs criteria (refer to Section 3.13 of Chapter Three) were used. This section provided information that answers research question number three (see Appendix 4.8).

Section 5

This section sought information on use patterns of various ICTs by the people in these areas and on the type of information people needed for their day-to-day livelihoods and the extent to which ICTs are used to facilitate the availability of such information. Section 5 sought information on commonly used means of obtaining and sharing information. It provided answers to research question number four (see Appendix 4.8).

Sections 6 and 7

These two sections provided information on the impact of telecentre services and telephone services on livelihoods. The section sought information on the impact that the ICT had on three capital assets in the sustainable livelihoods framework. These were financial assets (such as income), social assets (such as networking) and human assets (access to and use of information and knowledge resources). The section sought information on the purposes for which ICTs are used by people in these areas and how important the ICTs are during emergencies, natural disasters or seasonal variations in prices or food supply. This information helped to answer research question number five (see Appendix 4.8).

Section 8

This section provided information on the information needs and the information-seeking behaviour of the respondents, using the critical incident technique (CIT) procedure. Through CIT an examination was made on how people or communities seek information concerning problem-solving situations, decision-making or question-answering situations. Through this technique the study sought information on the extent to which ICTs were used in information-seeking and which information needs lend themselves to using information provided by ICTs. Section 8 provided answers to research question number four (see Appendix 4.8).

4.7.1.1.2 Critical incident technique (CIT)

The critical incident technique (CIT) was applied when interviewing users and non-users of the telecentres, to get more information from the respondents. CIT is a qualitative, open-ended and a retrospective method which examines how people or communities seek information concerning problem-solving situations, decision-making or question- answering situations. Respondents were asked why and how they sought information and through this process various common situations or the critical tasks of a community were identified (Kaniki 1994: 11; Kaniki 2001: 195; Stilwell 2002: 70).

The approach to information seeking behaviour using CIT was also informed by the broader theory relating to an Anomalous State of Knowledge (ASK) which was advanced by Belkin (Belkin 1980). The ASK approach suggests that the basic motivator of information seeking is an anomalous state of knowledge which exists when a person recognises that there is an anomaly (that is a gap or uncertainty) in their state of knowledge regarding a situation (Case 2002: 69). Faced with an ASK situation individuals may attempt to address their uncertainty by requesting or consulting information (Case 2002: 69).

Stilwell (2002: 70) described ASK as a qualitative approach which assists exploration of how people or communities seek information concerning situations about which their knowledge is incomplete. Insights from both the broader ASK and the CIT informed the design which was used to determine the information needs and seeking-behaviour of the respondents in the present study. The approach was used to find out in what particular situations people in these areas seek information and the extent to which ICTs are used in information-seeking and what information needs lend themselves to using information provided by ICTs.

The CIT was first developed from work in the U.S. army air forces aviation psychology programme by Flanagan, in 1954 (Edvardsson 1992: 9). CIT was originally used to assess performance in professional practice and it has been applied in service research such as in health and in aviation sectors. The technique is used as a tool for reflecting customer-perceived quality and customer dis/satisfaction, based on positive and negative critical incidents (Edvardsson and Roos 2001: 251). The technique has also been used in market

research, as it allows detailed descriptions of critical incidents as customers perceive them (Edvardsson and Roos 2001: 251). CIT is regarded as a flexible set of principles which may be modified for the situation under study (Urquhart *et al.,* 2003). In recent years the technique has been adopted by information professionals. Various libraries and information science researchers have applied the technique to study the information needs of specific groups of people and communities (Fisher and Oulton 1999; Ikoja-Odongo and Ocholla 2004; Kaniki 1995; Leckie and Pettigrew 2000; Stilwell 2002; Urquhart 2001; Urquhart *et al.,* 2003).

A critical incident is defined as observable human activity that is sufficiently complete in itself to permit inferences and predictions to be made about the person performing the act. To be critical, an incident must occur in a situation where the purpose or intent of the act seems fairly clear to the observer and where its consequences are sufficiently definite to leave little doubt concerning its effect (Davis 2006; Edvardsson 1992; Edvardsson and Roos 2001: 252; Flanagan 1954: 327). A critical incident can further be depicted as the one that can be described in detail and that deviates significantly, either positively or negatively, from what is normal or expected.

A critical incident can also be described as interaction incidents, which the customer perceives or remembers as unusually positive or negative when asked about them. Customers recall them and tell them as stories (Edvardsson and Roos 2001: 252). The CIT encourages participants to tell their story. The situations that are explored are those that are memorable and that are more likely to be faithfully recalled, although there is no guarantee that this will be the case.

The CIT has been compared to sense-making methodology developed by Dervin in 1972 (Dervin and Foreman-Wernet 2003: vi). The sense-making technique has been applied in various studies to determine user information needs and information-seeking behaviour. These include Ellen (2003: 77), Morris (1994), Savolainen (1993) and Savolainen (2006). Dervin (1996: 5) argues that information needs are situationally bound and that information-seeking and use occur when individuals find themselves unable to progress through a particular situation without forming some kind of new ‘sense’. In sense-making techniques

data is collected by framing questions which ask respondents to identify situations, gaps faced, gaps bridged and helps them to make sense of situations.

CIT was chosen in preference to the sense-making method because of its applicability to the current study and the need to focus the investigation of the information needs and seeking behaviour on the incidents experienced by the respondents. Both techniques study the information needs by framing questions based on the world view of the users, rather than from the observer's world view. Like CIT, sense-making seeks to situate respondents in a specific moment related to a phenomenon of interest and ask them to discuss, in detail, an incident. CIT differs from sense-making by being more focused on the incidents, whereas sense-making takes a wider approach.

Edvardsson (1992: 19) pointed out that data collection regarding critical incidents can be done in many ways, such as by personal interviews, focus group interviews and direct or participatory observation. Kaniki (1995: 11) stated that the techniques can be used in conjunction with self-administered questionnaires or interviews. This study applied the CIT investigations during individual interviews with respondents.

4.7.1.1.3 Administering the CIT

The instrument used to administer the CIT was adapted from the one used by Kaniki (1995) in an exploratory study of the information needs of two rural communities in South Africa. However, the instrument was slightly modified to suit the purpose of this study. The decision to re-use the instrument of this previous research in the present study was made because of its focus on information needs and information-seeking behaviour of the people living in rural communities. The fact that this instrument was tried and found to be successful was another reason for re-using it.

In the present study, a critical incident was defined as one (decision-making, question-answering or problem-solving) with which a member of the community had an encounter and that which was a critical problem. Respondents were asked to recall, in detail, a critical incident they had experienced. Each respondent was asked to describe a situation or instance which he/she had experienced within the previous month in which he/she was supposed to

make a decision, find an answer to a question, solve a problem, or try to understand something. Respondents were asked to explain as many situations as they could remember. For each instance, they were asked to describe what were the most important questions they needed to answer, the most important things they wanted to learn or find out and the most important things they wanted to understand better or just think about.

Thereafter the respondents were asked to explain the context of each of the instances/situations whether, it was work/business, family issues or school related. Respondents were asked to explain whether or not they attempted (depending on the nature of the situations the respondent described) to reach a decision, answer the question, solve the problem or understand what they needed to understand. Finally, they were asked how, where, from whom, or by what means, they received the answer or help, and the extent to which they were satisfied or dissatisfied with the answers.

Some of the disadvantages of the CIT are the difficulties associated with the ability of the respondents to recall all the important incidents and much of the information seeking process. However, it is sometimes argued that people will often remember what they consider to be critical to them (Kaniki 2001: 195). The techniques is less equipped to explore those situations in which there was no decision to act, or where the user was unaware of the information need or suppressing (consciously or unconsciously) the perception of the information need as a soluble problem. Despite all these criticisms Kaniki (1995: 11) is of the opinion that the CIT can still be used to assess community information needs. The technique is particularly useful in developing countries, where most people are unaware of the kind of services provided by the information systems.

All the research instruments which were used for data collection from users and non-users of the telecentres were translated into Swahili, because Swahili is the most commonly used language in the researched areas.

4.7.1.2 Semi-structured interviews

In semi-structured interviews, a basic framework, a set of basic questions and a given procedure is provided, but greater latitude is granted to the interviewer on how different respondents are treated, probed and prompted. The interviewer is free to modify the format

and the order of questions as appropriately as possible (Ratcliffe 2002: 21; Robson 2002: 270).

Semi-structured interviews take a wider variety of forms and fulfil a diverse range of functions. For the purpose of this study, semi-structured interviews were conducted with managers of telecentres and with personnel responsible for telecentre projects at COSTECH, TCRA and the then MoID in Dar es Salaam. A different semi-structured interview protocol was developed for each of these categories of respondents. Therefore the study had four different sets of semi-structured interview protocols.

4.7.1.2.1 Semi-structured interview protocol with managers of telecentres

Interviews with managers of telecentres aimed at seeking information about what services were offered by the telecentre, how the services were utilised by the people in the area and what proportion of members of these communities utilised the services and sustainability issues of the telecentre (see Appendix 4.4). This unstructured interview protocol, with all open-ended questions, was used to interview all the managers in all the four telecentres visited. However, slight modifications were made to fit the instrument to the specific conditions and circumstance of each telecentre. The instrument was just used as a guideline and more information was obtained by way of probing and asking follow- up questions.

4.7.1.2.2 Semi-structured interview protocol with officers from TCRA, COSTECH and MoID

Interviews with officers from TCRA, COSTECH and the national ICT co-ordination office in the MoID, investigated what policies are in place regarding the development of the ICT sector and its utilisation in rural areas of Tanzania and how these policies are implemented. Policies investigated include the Tanzania national ICT policy, the universal access[13] policy and other related national policies and strategies which are currently in place to facilitate ICT infrastructure development in rural areas of Tanzania, as raised by the second research question (see Appendix 4.5, 4.6 and 4.7).

[13] Universal access refers to the policy of ensuring that members of the community are able to use ICTs, often via public provision through public phones and telecentres. It is a goal adopted by many developing countries to provide convenient and affordable access to communications (Intven and Tetrault 2002).

4.7.2 Focus group discussions

Focus group discussions are a means of obtaining information from people in a group. It is an interview with several people on a specific topic or issue (Bryman 2004: 345). Instead of asking questions of each person in turn, focus group researchers encourage participants to talk to one another, asking questions, exchanging anecdotes and commenting on each other's experiences and points of view. Focus groups are group discussions exploring a specific set of issues. They usually involve a narrowly focused topic discussed by group members of equal status (Payne and Payne 2004: 103). The group is 'focused', in that it involves some kind of collective activity, such as debating a set of questions on a specific topic (Barbour and Kitzinger 1999: 4; Robson 2002: 285). Having gained significant popularity among market researchers, focus group discussions are becoming widely used by information science professionals to gather data on group norms and shared experiences (Von Seggern and Young 2003: 272).

Barbour and Kitzinger (1999: 5) explained that focus group discussions are better for exploring how points of view are constructed and expressed, are well suited to the study of attitudes and experiences around specific topics and they are invaluable for examining how knowledge, ideas and story-telling operate within a given cultural context. The aim of focus group discussion is mainly to gain rich and often exploratory information (Tacchi, Slater and Hearn 2003). Focus group discussions are important because the group develops its own conversation, raising issues and ideas that might not emerge in a discussion with the interviewer alone (Cohen, Manion and Morrison 2000: 288). In this study focus group discussions were held with members of the communities surrounding the telecentres (users and non-users of the telecentre) to gain richer understanding of actual practices of use and interaction with technologies in the wider context of people's lives and socio-cultural structures.

Focus group discussions are normally used for triangulation purposes, or in conjunction with other data-gathering techniques (Barbour and Kitzinger 1999: 6; Cohen, Manion and Morrison 2007: 376; Denzin and Lincoln 2005: 704). Bloor *et al.* (2001: 8, 12) pointed out that focus groups have a much large part to play as an ancillary method, alongside and

complementing other methods. The focus group data may as well be compared with other data on the same topic gathered by other methods. For these reasons this study used focus group discussions, in conjunction with other data-collection methods. These discussions were used to gather supplementary data, as well as verifying some points that emanated from some of the responses to the individual interviews.

In conducting focus group discussions, the present researcher had to consider a number of factors. These include deciding on the size and composition of the groups, deciding on the number of focus groups to be conducted and deciding on the criteria to be used to select participants to be included in the discussions (Cohen, Manion and Morrison 2000: 289; Morgan 1988: 41-8; Morgan and Scannell 1998: 6). In most cases, all these decisions depend on the purpose of the research (Fern 2001: 11; Morgan and Scannell 1998: 6). The following section presents overviews of the decisions that the researcher had to make concerning the focus groups discussions which were used in this study.

4.7.2.1 Group sizes

Different studies have used different group sizes in focus group discussions. Therefore studies are not agreed on the size of the focus groups to be used (Mosia and Ngulube 2005: 178). Barbour and Kitzinger (1999: 8) cautioned that advice about groups' size and composition in existing guides to focus group research is often didactic and this can hamper effective application of focus group methods. The ideal number recommended from the literature of between eight and 12 people is coming mainly from market research and might be too large for many sociological studies. Table 4.2 summarises selected optimal groups sizes found in the literature, in order to demonstrate the varying sizes of groups researchers are likely to find in the literature.

Table 4.2 Optimal focus group size found in the literature

Author(s)	Optimal focus group size
Morgan 1988: 43	4-12
McClellard (1994: 29)	8-12
Morgan and Scannell (1998: 71)	6-10
Barbour and Kitzinger (1999: 8)	3-5
Greenbaum (2000: 3)	7-10
Bless and Higson-Smith (2000: 110)	4-8
Bloor *et al.* (2001: 26)	6-8
Sekaran (2003: 220)	8-10
Von Seggern and Young (2003: 274)	4-12

Adopted and modified from Mosia and Ngulube (2005: 178)

When deciding the size of groups for focus group discussions, it is recommended that the group should not be so large as to be unwieldy, or to prevent adequate participation by most members, nor should it be so small that it fails to provide substantial greater coverage than that of an interview with one individual (Bloor *et al.,* 2001: 27; Merton, Fiske and Kendall 1990:137; Morgan 1988: 41). Morgan and Scannell (1998: 71) indicated that deciding on the right numbers of participants for a focus group means striking a balance between having enough people to generate a discussion and having so many people that some feel crowded out. Cohen, Manion and Morrison (2007: 377) stated that with a small group the intra-group dynamics will exert a disproportionate effect, while with too large a group the group becomes unwieldy and hard to manage. The decision on the number of respondents to be included in the group discussion should take into consideration the number of questions (typically 8-12) that the discussion guide have and the duration (typically 1 to 2 hours) the discussion would last. In this case, the discussions lasted for two hours (Morgan and Scannell 1998: 71).

4.7.2.2 Group composition

Closely related to the issue of the size of the focus groups is the composition of these groups. Interaction between participants is a key feature of the focus group method and therefore careful consideration of group composition is vital (Fern 2001: 16). In determining the

composition of the groups, the present study paid attention to the issues of compatibility of the participants. Cohen, Manion and Morrison (2007: 377) said extreme care should be taken with composition of focus groups, such that every participant is the bearer of the particular characteristic required, or that the group has homogeneity of background in the particular areas, otherwise the discussion will lose focus or become unrepresentative. Morgan and Scannell (1998: 59) advised that when the participants perceive each other as fundamentally similar, they can spend less time explaining themselves to each other and more time discussing the issues at hand. Morgan and Scannell (1998: 59) explained that generating a productive discussion requires good group dynamics and that depends on compatibility of the participants. To achieve compatibility the present study paid attention to the issue of background of the respondents, such as the participants' experiences with the use of ICTs. Different groups were conducted for users of telecentres and those who were relatively experienced with the use of ICTs. Different groups were conducted for non-users of telecentres and those who were relatively less experienced with ICTs. This was important, because different experiences with the use of these technologies produce different perspectives (Morgan and Scannell 1998: 65).

Taking into consideration all the above factors, this study used group sizes of between six and 12 people, depending on the availability of the respondents. The decision to use relatively large groups for this study was influenced by the fact that the level of engagement of members of these communities with these new technologies was generally low. Morgan and Scannell (1998: 69) recommended that small focus groups be used when talking with experts or people who are well experienced with regard to the issues that are being discussed and when each participant has much to say on the topic. They advised that large groups should be used when talking to people who are less experienced with the issue under discussion. Morgan and Scannell (1998: 75) stressed that non-users and people who have never used a service or a product have little to say about it, yet these non-users are often crucial target audiences.

4.7.2.3 Number of groups

Commenting on the number of focus group discussions to be conducted in a study, Morgan (1988: 41-8) warned that one group is never enough. Morgan and Scannell (1998: 82) agreed

that using one group is often risky. Cohen, Manion and Morrison (2007: 377) stated categorically that one group is insufficient, as the researcher will be unable to know whether the outcome is unique to the behaviour of the group. Bryman (2004: 349) said it is unlikely that one group would satisfy the needs of the researcher, since there is always the possibility that the responses are particular to that one group. The number of focus groups in a study may vary from three or four to over fifty (Barbour and Kitzinger 1999: 7; Bloor *et al.*, 2001: 28; Morgan and Scannell 1998: 77). However, Morgan and Scannell (1998: 77) said that there is no hard and fast rule about how many groups are sufficient. Dealing with too few groups may result in one missing something, or lead to premature conclusions, but using too many is a waste of time and money. Bloor *et al.* (2001: 28) pointed out that focus groups are labour intensive in recruitment, transcription and analysis. Therefore, where possible, numbers should be kept down to a bare minimum. The appropriate number of focus groups depends on the research questions, the range of people the researcher wishes to include and time and resource limitations.

Morgan and Scannell (1998: 77) stated that the biggest issue in determining the number of groups is the underlying diversity of what people have to say. If practically everyone has the same thoughts on a topic, this will be evident after a few groups and the "theoretical saturation" will be reached rather soon, whereas when the responses are more diverse, it will take considerably more groups to hear what people have to say. This study conducted two focus group discussions in each of the communities surrounding each telecentre. The whole study had eight focus group discussions in total. (See section 4.10.2 for details)

4.7.2.4 Selection of group members

Statistical representation is not the aim of most focus groups research. Usually, focus groups researchers employ 'qualitative sampling', in order to encompass diversity and compose a structural rather than a random sample, guided by the particular research questions which they are addressing (Morgan and Scannell 1998: 56) As with most other qualitative methods, the focus group method relies on purposive samples. In purposive sampling respondents or other units are chosen for a particular purpose (Leedy and Ormrod 2005: 206; Robson 2002: 265). A purposive sampling strategy chooses the focus group participants according to the project's

goals. Using purposive sampling the participant should be selected using well-defined purposive selection criteria, as opposed to convenience samples, which emphasised the ease of recruiting the participants (Morgan and Scannell 1998: 56).

In this study, selection of respondents to be involved in the focus group discussions was done in such a way that there was a representation of the strata used in identifying participants for the structured individual interviews. This means the respondents involved in the focus group discussions were people who were involved in various economic activities such as farming, livestock-keeping, small-scale businesses, fishing and small-scale mining activities, based on what the dominant economic activities in each community were. Groups were structured in such a way that users of telecentres and those who were relatively experienced with the use of ICTs were placed in one group. Non-users of telecentres and those who were relatively less experienced with ICTs were in another group. Selection was influenced by the type of information obtained and lessons learned during individual interviews.

The major attraction of focus group discussions over other data collection techniques, as pointed out by Cohen, Manion and Morrison (2000: 287), Cohen, Manion and Morrison (2007: 378), Denzin and Lincoln (2005: 704-5), Leedy and Ormrod (2005: 146), Ratcliffe (2002: 21), Robson (2002: 284-5), were the following:

- The potential for discussions to develop, thus yielding a wide range of responses;
- Can generate a wider range of responses than individual interviews;
- Might be useful for gaining insight into what might be pursued in subsequent individual interviews;
- They are often quicker than individual interviews and hence are time-saving and involve minimal disruption;
- They are inexpensive to conduct and often produce rich data that are cumulative and elaborative;
- Can be stimulating for respondents and aid recall; and
- Provide natural quality control on data collection because participants tend to provide checks and balances on each other and extreme views tend to be weeded out.

Focus group discussion has a number of disadvantages, which the researcher was aware of, and tried to reduce their negative effects in this study as much as possible.

- Results cannot easily be generalised;
- The emerging group culture may interfere with individual expression;
- The group may be influenced by one person and group-thinking is a possible outcome;
- The requirement for interviewer (moderator) skills are said to be greater than that for individual interviewing, because of the group dynamics that are present;
- It is difficult to research sensitive issues with focus group discussion; and
- Confidentiality can be a problem between participants when interacting in a group situation.

4.7.3 Observation

Observation is described as a powerful tool for gaining insight into situations (Cohen, Manion and Morrison 2000: 315). As the actions and behaviour of people are pivotal aspects in virtually any enquiry, a natural and obvious technique is to watch what they do, to record this in some way and then to describe, analyse and interpret what has been observed (Robson 2002: 309). Observation is considered important in research because it gives the researcher an opportunity to look at what is taking place '*in situ*' rather than at second hand (Patton 1990: 203-5). According to Cohen, Manion and Morrison (2000: 305), observation enables the researcher to see things which might otherwise be unconsciously missed, to discover things which participants might not freely talk about in interview situations and during focus group discussions and, therefore, to move beyond perception-based data and to access personal knowledge.

Morrison (1993: 80) felt that observation enables the researcher to gather data on the physical setting, such as the environment and its organisation, on the human setting, such as the organisation of people, the characteristics and make-up of the groups or individuals being observed and the interactional setting, such as the formal and informal, planned and unplanned, verbal and non-verbal and the programme-setting, such as the resources and their organisation.

Observation can be used for several purposes. Robson (2002: 313) observed that observation can be used as a supportive or supplementary method to collect data that may complement or set in perspective data obtained by other means. Observation can also be used in the exploratory phase, typically in the unstructured form, to seek to discover what is going on in a situation as a precursor to subsequent testing the insights obtained. Observation can be used as a supportive or supplementary method to collect data that may complement, or set in perspective, data obtained by other means; it could be used in a multi-method case study, or other types of flexible designs.

Observation as a data-gathering technique can be classified in two major ways. The first one as described by Cohen, Manion and Morrison (2000: 305), Leedy and Ormrod (2005: 146), is classification on the basis of the degree of pre-structure in the observation exercise, whereby the observation techniques can be classified as being structured, semi-structured or unstructured. In a highly structured observation the observer will know in advance what to look for, while in unstructured observation it will be far less clear what the observer is looking for. The semi-structured observation present the middle ground between the two, whereby the observer will have an agenda of issues to be observed, but will gather data to illuminate these issues in a far less pre-determined or systematic manner.

The second category is classification on the basis of the role adopted by the observer and the extent of participation in that situation (LeCompte and Preissle 1993: 93-4; Leedy and Ormrod 2005: 146 and 313). In this case, the researcher can fully participate and effectively become a part of the group or whatever is being studied. The observer role can be non-participatory, also called unobtrusive observation, whereby the researcher seeks to be an unnoticed part of the process (Leedy and Ormrod 2005: 310). The participating observers tend to use flexible designs and qualitative, unstructured approaches whereas the non-participant observer tends to use fixed-designs and quantitative, structured methods and employ the use of the instruments or the observation guide.

For the purpose of the present study, observation was applied to critically observe issues that are relevant to the study. These included the telecentre premises, the type of hardware available, the activities taking place and the type of information resources available.

Observation also involved engaging with people in real-life situations at the telecentre, to look at what people actually did, as well as what they said. Where necessary, the researcher participated in formal events such as computer classes and meetings. The researcher participated in informal events such as casual conversations. An observation guide (see Appendix 4.3), with an outline of the main issues to be observed at the telecentre and the surrounding communities, was used.

Depending on the circumstances, observation was extended beyond items listed in the observation guide and was accompanied by the taking of field notes, to record everything that was being observed. Observation was an ongoing process that coincided with other data collection methods in communities surrounding the telecentres. This process lasted for the entire duration of data collection which, in this case, was six months.

Advantages and disadvantages of the observation method, as listed by Leedy and Ormrod (2005: 310-1), are the following:

- The major advantage of the observation technique is its directness – the researcher does not ask people their views, feelings or attitudes, but simply watches what they do and listens to what they say;
- Data from direct observation contrasts with, and often usefully complements, information obtained by any other method;
- It is a pre-eminently the appropriate technique for uncovering real life in the real world; and

Disadvantages

- The extent to which the observer affects the situation under observation is a major issue of concern when using the observation technique; and
- It is time consuming.

4.8 Problems encountered during data collection

Several problems were faced by the researcher during data collection fieldwork. These included transportation problems, difficulties in getting sensitive data, problems associated with the definitions of various ICT-related terms and possible bias of the respondents. Three of the sites visited are located in very remote areas of Tanzania. These are Sengerema,

Karagwe and Ngara. Consequently, time was used travelling on rough roads to these research sites. For instance, Ngara is located in the extreme north-west of Tanzania. It is approximately 1,600 kilometres from the capital city, Dar es Salaam, and 350 kilometres from the regional headquarters, Bukoba. Karagwe is 1,800 kilometres away from Dar res Salaam.

In the case of Karagwe, the roads joining this district to the rest of the country are all not tarmacadamised and need regular maintenance to make them passable throughout the year. However, these roads are not always maintained and therefore, although a very high-potential agricultural area, there is no free movement of people and goods in and out Karagwe. In the case of Sengerema, the main access is by way of a ferry across Lake Victoria and thereafter by road to Sengerema, a trip which can take anything from two hours to a whole day or more, depending on the means of transport used and the weather. When going to Sengerema it took the researcher two hours to travel by bus on the road from Kamanga to Sengerema. However, four weeks later, after the research was completed, it took ten hours to travel via the same road because of heavy rains, which caused a large portion of the road to be flooded.

Another problem was difficulty in getting sensitive data from respondents, particularly data concerned with income and expenditure from their farming and businesses. This was especially the case with medium-scale business people. Small-scale farmers and business people, on the other hand, were very willing to share information, but had difficulty in recalling some of it, as they generally do not keep records of their expenditure and costs. Respondents' difficulty in recalling information was a general problem at all the study sites.

The researcher experienced problems in explaining and defining terms such as internet, email, computer, computer network and mobile phone network. All the instruments were translated into Swahili (a language understood by all the respondents) and the equivalent of these terms in Swahili was used. However, most of the terms were new, difficult to understand and confusing to most of the respondents. This was especially so because some of the respondents had not even seen a computer let alone used one.

Due to the fact that most of these telecentres are donor-funded projects, there is a possibility of bias by the respondents. This is especially the case for the users of the telecentre who had a

very positive and somehow exaggerated view of the usefulness of the telecentres. The respondents might have confused the identity of the researcher with that of a donor and this might have led to a conscious or unconscious appraisal of the projects by the respondents, in order to please the donor.

4.9 Validity and reliability of the study

This research is a multi-case study and a mixed methods investigation, which utilised qualitative and quantitative methods. The most prevalent approach in this study is the qualitative design. The issue of the validity and reliability of the study were dealt with in cognizance of the variations in which these issues are considered in both qualitative and quantitative designs.

Validity and reliability are the major technical considerations in quantitative and qualitative research (Babbie and Mouton 2001: 119). In the broadest sense, reliability and validity addresses issues concerning the quality of the data and appropriateness of the methods used in carrying out a research project. The quality of the data and the appropriateness of the methods employed are particularly important in social sciences, because of the different philosophical and methodological approaches to the study of human activity (Cano 2005).

The broad concepts of reliability and validity are applied to all research, because the goal of finding plausible and credible explanations for outcomes is central to all research. Morse *et al.* (2002) stated that the concepts of reliability and validity as overarching constructs can be appropriately used in all scientific paradigms, because to validate is to investigate, to check, to question and to theorise. Lincoln and Guba (1985) cautioned that while all research must have "truth value", "applicability", "consistency" and "neutrality" in order to be considered worthwhile, the nature of knowledge within the rationalistic (quantitative) paradigm is different from the knowledge in naturalistic (qualitative) paradigm. Consequently, each paradigm requires paradigm-specific criteria for addressing "rigour" (the term most often used in the rationalistic paradigm) or "trustworthiness", their parallel term for qualitative "rigour".

Morse *et al.* (2002) elaborated that whether quantitative or qualitative methods are used, rigour is a desired goal that is met through specific verification strategies. Morse *et al.* (2002) warned that, without rigour, research is worthless, becomes fiction and loses its utility. A great deal of attention should therefore be applied to reliability and validity issues in all research methods.

4.9.1 Validity and reliability in quantitative research

In quantitative research validity refers to the capacity of the research technique to encapsulate the characteristics of the concepts being studied and so properly to measure what the methods were intended to measure (Payne and Payne 2004: 233). Validity is mainly concerned with the extent to which the measuring devices would yield accurate results and capture the essence of what they are intended to represent (Babbie and Mouton 2001: 122; Leedy and Ormrod 2001: 31). Joppe (2000: 1) provides the following explanation of what validity is, in quantitative research:

> Validity determines whether the research truly measures that which it was intended to measure or how truthful the research results are. In other words, does the research instrument allow the researcher to hit "the bull's eye" of the research object? Researchers generally determine validity by asking a series of questions, and will often look for the answers in the research of others.

In quantitative research**,** reliability is mainly concerned with the extent to which similar results will be obtained if the study were to be repeated (Payne and Payne 2004: 195). Research findings are considered to be reliable if they are repeatable, to the extent that repeated measures would yield constant results (Babbie and Mouton 2001: 119; Cohen, Manion and Morrison 2000: 117; Leedy and Ormrod 2001: 31; Payne and Payne 2004). Kirk and Miller (1986: 41-42) identify three types of reliability referred to in quantitative research, which relate to: (1) the degree to which a measurement, given repeatedly, remains the same (2) the stability of a measurement over time; and (3) the similarity of measurements within a

given time period. A high degree of stability indicates a high degree of reliability, which means the results are repeatable (Golafshani 2003: 598).

4.9.2 Validity and reliability in qualitative research

Validity and reliability are two factors which any qualitative researcher should be concerned about while designing a study, analysing results and judging the quality of the study. It is important for an inquirer to be able to persuade his or her audiences that the research findings of an inquiry are worth paying attention to (Lincoln and Guba 1985: 290).

Since validity and reliability are rooted in quantitative research, there is a need for validity and reliability to be re-defined for their use in qualitative research. Robson (2002: 170) felt that there is a need to find alternative ways of operationalising these terms that are appropriate to the conditions and circumstances of qualitative enquiry. Consequently, the quality of a study in each paradigm should be judged by its own paradigm's terms. In other words, these terms, as defined in quantitative terms, may not directly apply to the qualitative research paradigm. For instance, the question of replicability in the results does not directly apply in some form of qualitative research, as it does in quantitative research (Golafshani 2003: 597; Winter 2000).

Patton (2001: 14) pointed out that, while the credibility in quantitative research depends on instrument construction, in qualitative research “the researcher is the instrument." Thus it seems when quantitative researchers speak of research validity and reliability, they are usually referring to research that is credible while the credibility of qualitative research depends on the ability and effort of the researcher. To emphasise this point, Robson (2002: 168) said that while the essential test of validity of findings in the natural sciences is that it has been directly replicated by an independent investigator, this approach is not feasible when a qualitative design is used and is highly questionable in real-world flexible (qualitative) designs involving people, as it can be complicated to created identical circumstances for the attempt to be replicated. The same point was raised by Marshall and Rossman (1999: 195).

Another argument in the same vein is that the term reliability and validity are treated separately in quantitative studies, whereas these terms are not viewed separately in qualitative research. Instead, terminology that encompasses both, such as credibility, transferability and trustworthiness, is used (Golafshani 2003: 600). To widen the spectrum of conceptualisation of reliability, and revealing the congruence of reliability and validity in qualitative research, Lincoln and Guba (1985: 316) state that: "Since there can be no validity without reliability, a demonstration of the former [validity] is sufficient to establish the latter [reliability;]" Patton (2001) stated that reliability is a consequence of the validity of a study.

Different scholars have provided guidelines on how validity and reliability can be conceptualised in qualitative research. Golafshani (2003) and Morse *et al.* (2002) observed that, in qualitative research, validity and reliability are mainly conceptualised as trustworthiness, rigour and quality of the research. Cohen, Manion and Morrison (2000: 105) stated that in qualitative research validity might be addressed through the honesty, depth, richness and scope of the data achieved, the participants approached and the extent of triangulation. Guion (2002) pointed out that in qualitative research validity and reliability relate to whether the findings of the study are true and certain, "true" in the sense of the findings accurately reflecting the real situation and “certain" in the sense of the findings being backed by evidence. There should be no good grounds for doubting the results, meaning that the weight of evidence supports the conclusions.

Lincoln and Guba (1985: 294-301) substituted reliability and validity with the parallel concept of “trustworthiness,” containing four aspects: credibility, transferability, dependability and confirmability. The same alternative terms were recommended by Robson (2002: 403-7). Within these concepts there were specific methodological strategies for demonstrating qualitative rigour, such as the audit trail, member checks when coding, categorising, or confirming results with participants, peer debriefing, negative case analysis, structural corroboration and referential material adequacy.

Morse *et al.* (2002) listed strategies for ensuring rigour in qualitative research. These are investigator responsiveness, methodological coherence, theoretical sampling and sampling

adequacy, an active analytic stance, and saturation. The authors stated that these strategies, when used appropriately, force the researcher to correct both the direction of the analysis and the development of the study, as necessary, thus ensuring reliability and validity of the completed project.

Seale (1999: 266) stressed that to ensure reliability in qualitative research, examination of trustworthiness is crucial. He explained that "trustworthiness of a research report in qualitative research lies at the heart of issues conventionally discussed as validity and reliability". Robson (2002: 171) said validity in qualitative research has something to do with the research being accurate or correct or true. Robson (2002) presents some of the issues which can be considered as threats to validity in qualitative research, which researchers should pay attention to. These threats include inaccuracy or incompleteness of the data, imposition of a framework or meaning on what is happening, rather than this occurring or emerging from what one learnt during his or her involvement with the setting, without considering alternative explanations or understanding of the study. Marshall and Rossman (1999: 196-7) listed criteria which can be used by qualitative researchers, to assess the trustworthiness of their research. These include: the design and methods should be explicitly detailed, the research question and the data's relevance are made explicitly and rigorously argued, the study is situated in a scholarly context, and records are properly kept.

Different strategies were used to ensure validity and reliability in the present study. These were triangulation, verification and instrument pre-testing, translation and approval.

4.9. 3 Triangulation

Triangulation may be defined as the use of two or more methods of data collection in the study of some aspect of human behaviour (Cohen, Manion and Morrison 2000: 112). It involves the use of multiple sources to enhance the rigour of the research (Robson 2002: 174). Combining research methods in collecting data offers the promise of getting a 'complete' picture, in a way that a single method cannot achieve (Ngulube 2005: 140). This is important because each method has its shortfalls and the only way to offset these is to apply another method that will help to counteract the shortfalls.

According to Campbell and Fiske (1959) cited in Cohen, Manion and Morrison (2000: 112), triangulation is a powerful way of demonstrating concurrent validity, particularly in qualitative research. Concurrent validity is achieved when data gathered from using one instrument correlate highly with data gathered using another instrument, that is when the result obtained from different data collection instrument all agree or concur (Cohen, Manion and Morrison 2007: 140-141). Robson (2002: 175) and Golafshani (2003: 603) emphasised that triangulation can help to counter all the threats to validity and hence help qualitative researchers establish validity in their studies. Mathison (1988: 13) explained that triangulation has raised an important methodological issue in naturalistic and qualitative approaches to evaluation [in order to] control bias and establish valid propositions, because traditional scientific techniques are incompatible with this alternate epistemology.

The idea behind triangulation is that the more agreement there is from different data sources on a particular issue, the more reliable the interpretation of the data is. Patton (2002: 247) advocates the use of triangulation by saying "triangulation strengthens a study by combining methods. This can mean using several kinds of methods or data, including using both quantitative and qualitative approaches". Guion (2002) named five types of triangulation which can be used by qualitative researchers to check for the validity of their studies: data triangulation, investigator triangulation, theory triangulation, methodological triangulation and environmental triangulation. However, triangulation can be time-consuming and a researcher using multiple methods may face difficulties when conflicting results are obtained from these multiple methods. For the purposes of the present study, triangulation was employed at two different levels, to ensure the validity and reliability of the study. These levels include data triangulation and methodological triangulation.

4.9.3.1 Data triangulation

Data triangulation involves the use of different sources of data or information. It also involves categorising each group or type of stakeholder for the programme that is being evaluated (Guion 2002). Data from different sources can be used to corroborate, elaborate or illuminate the research in question (Marshall and Rossman 1999: 194). Data triangulation in this study was achieved by the inclusion of various stakeholders in the study (that is, users and non-

users of the telecentres, managers of telecentres and personnel responsible for telecentre projects in government agencies which are currently actively involved in introducing rural telecentres in Tanzania). This helped to corroborate data sources, to enhance the validity and reliability of the findings.

These sources of data were triangulated by looking for outcomes that are agreed upon by all stakeholder groups. This type of triangulation is important because, as pointed out by Guion (2002), if every stakeholder who is looking at the issue (in this case of ICTs and socio-economic development) from different points of view sees an outcome in the same way then it is more than likely to be a true outcome.

4.9.3.2 Methodological triangulation

Methodological triangulation involves the use of multiple qualitative and/or quantitative methods to study the programme. If the conclusions from each of the methods are the same, then validity is established (Guion 2002). The present study utilised case study research design, with multiple data gathering methods for the purpose of collecting both qualitative and quantitative data. Data for this study was collected using structured interviews, semi-structured interviews, focus group discussions and the observation method. These methods were used in a complementary fashion and evidence was compared across all these methods, so as to ensure rigorousness of the collected data. Robson (2002: 370) named one important benefit of multiple methods/methodological triangulation as being the reduction of inappropriate certainty. Using a single method and finding a pretty clear–cut result may delude investigators into believing that they have found the 'right' answer, while using other additional methods may point to different answers, which remove specious certainty.

4.9.4 Verification

Verification is the process of checking, confirming, making sure and being certain. In qualitative research, verification refers to the mechanisms used during the process of research to incrementally contribute to ensuring reliability and validity and, thus, the rigour of a study (Morse *et al.,* 2002). Verification mechanisms were woven into every step of the inquiry, so as to construct a solid product. The researcher was anxious to identify and correct errors

before they built up. During the whole process, the researcher had to move back and forth between design and implementation, to ensure congruence among question formulation, literature, recruitment, data collection strategies and analysis. By way of using verification strategies, it was possible for the researcher to judge when to continue, stop or modify the research process, to achieve reliability and validity. For instance, while in the field, the researcher had to cross check the data collected each day against the research questions. This ensured that the data collected was relevant in answering the research questions. In Sengerema and Karagwe, telecentre managers and key informants were re-interviewed to fill in gaps in the data.

4.9.5 Instruments pre-testing, translation and approval

No matter how careful a data collection instrument is designed, there is always the possibility of error. The surest protection against such errors is to pre-test the instrument (Babbie and Mouton 2001: 244). Peterson (2002: 119) warns that no instrument should be considered ready for use until it has been pre-tested. Pre-testing the data collection instruments is one of the tools that may be used for content validation (Ngulube 2005: 136).

The interview schedules and the observation guide used in this study were prepared in consultation with the researcher's supervisor. The guidelines provided by Kothari (2004: 118) were used as well. The pre-testing was done for the purpose of controlling the quality of the instruments. The pre-testing of the instruments was done between December 2006 and January 2007. The pre-testing was conducted by a panel of experts consisting of practising library and information science professionals, a library and information studies professor, a practising language professional and an information systems lecturer. The participants were selected on the basis of their ability to provide a professional opinion concerning the instruments and their availability and convenience. The participants in the pre-testing of the instruments' and their occupations are shown in Table 4.3.

Table 4.3 Participants in pre-testing the instruments

Name	Occupation
Prof. M.P. Nyirembe	Professor, Department of Information Studies, University of Dar es Salaam, Tanzania.
Dr. A. M. Chailla	Senior Librarian, Sokoine National Agricultural Library, Morogoro, Tanzania.
Dr. B.L. Chachage	Lecturer, Faculty of Science, Mkwawa University College of Education, Iringa, Tanzania.
Dr. H. Kemoni	Lecturer, Department of Information Science, Moi University, Eldoret, Kenya.
Ms. E.T. Lwoga	Librarian, Sokoine National Agricultural Library, Morogoro, Tanzania and PhD candidate, University of KwaZulu-Natal.
Mr. F. W. Dulle	Senior Librarian and Director, Sokoine National Agricultural Library, Morogoro, Tanzania.
Mr. S.M. Joshua	PhD candidate, University of KwaZulu-Natal.
Ms P.S. Malangwa	Lecturer, Institute of Swahili Research, University of Dar es Salaam, Tanzania.

The participants provided useful comments for the improvement of the instruments. The comments were incorporated into the instruments to produce the final versions. The instruments were later translated into Swahili, after approval by the supervisor. The comments from pre-testing included editing, re-phrasing of some questions, splitting and combining some questions, re-arrangements of the sections, structuring some questions and giving respondents options to choose from.

After incorporating all the comments from pre-testing, the instruments were sent to the thesis supervisor for verification and approval. The final versions were translated into Swahili by the researcher and sent to the Swahili expert for checking. The researcher is able to use the English and Swahili languages for communication. She is a native Swahili speaker. This type of translation was described by Behling and Law (2000: 18) as “modified direct translation”,

whereby a bilingual individual translates the source language instrument into the target language. Thereafter the work of the original translator is checked and reviewed by an expert, to increase the quality of the target language version of the instruments.

The Swahili version of the instruments was reviewed by Ms P.S. Mlangwa, who is a lecturer at the Institute of Swahili Research, University of Dar es Salaam. The Swahili expert (Ms Mlangwa), who is also a native Swahili speaker, reviewed the instruments in close consultation with the researcher, as recommended by Behling and Law (2000: 19). This gave the expert an opportunity to share her concerns about the instruments with the researcher. It also gave the researcher an opportunity to explain the reasons for drafting the instruments in the manner in which they were drafted. These discussions were essential, because they increased validity and usability of the instruments. This is because the quality of the version in the language of the target group does not depend upon a single translator's skill and judgment. The discussions gave the researcher an opportunity to have input into the final version of the target language instrument. This is important because it is the researcher who had a deeper knowledge of the instruments and their uses.

As a way of making the instruments useful and easy to translate, the researcher framed the questions in the instruments with translation in mind. Therefore questions were carefully framed in a simple and easy way that could be translated easily.

4.9.6 Sampling adequacy and saturation

In this research, effort was made to ensure that the sample was appropriate, consisting of participants who best represent or have knowledge of the research topic. Different stakeholders dealing with ICTs at the community and national levels were consulted. Efforts were made to ensure that data saturation was reached before the researcher left the field. In this case the process of leaving the field by the researcher was gradual. The researcher left the field at the point at which she was learning less and less from observation and from the individual interviews with the respondents.

Saturation is defined as the process of adding cases (in this case respondents in the structured individual interviews) until the full range of what there is to observe/cover has been

uncovered. The actual number of cases is less important than the sense of having fully covered or saturated the topic of study. Saturation is achieved when new cases no longer yield new information (Bryman 2004: 305: Morgan and Scannell 1998: 78; Pickard 2007: 91). Leedy and Ormrod (2005: 159) said saturation is reached when any additional information is shedding little or no new light on the subject matter. Morse *et al.* (2002) felt that saturating data ensures replication in categories, replication verifies, and ensures comprehension, adequacy and completeness of the data.

For the purpose of this study, at each research site the point of saturation was reached after the researcher carried out between 40 and 55 individual interviews with users and non-users of the telecentres. This point was reached after conducting formal and informal interview with the managers of the telecentre and other staff. The informal interviews were conducted with various stakeholders of the telecentre in the communities. Informal interviews were conducted with staff of some developmental NGOs in these areas. In total the researcher spent approximately four weeks at each research station.

4.9.7 Other strategies adopted to ensure validity and reliability

Other strategies that the researcher adopted to ensure rigour in this study, as pointed out by Robson (2002: 168), include having an open and enquiring mind, being a good listener and generally sensitive and responsive to contradictory evidence. All procedures were properly checked to ensure they contained no obvious errors, flaws or bias, so as to ensure the validity and reliability of the study. To conclude this section the words of Golafshani (2003: 601) were:

> Researchers using qualitative designs do need to concern themselves seriously with the reliability of their methods and research practices. This involves not only being thorough, careful and honest in carrying out the research, but also being able to show others that they have been.

4.10 Data analysis

Data analysis, according to Kothari (1990: 151), involves a number of closely related operations which are performed with the purpose of summarising the collected data and organising them in such a manner that they answer the research questions. The operations include editing, coding, classifying and tabulating. It also entails categorising, ordering, manipulating and summarising data, to find answers to the research questions (Kerlinger 1986; Marshall and Rossman 1989: 114).

4.10.1 Analysing quantitative data with SPSS

SPSS was used to analyse quantitative data. Data from the semi-structured interviews with users and non-users of the telecentres that emanate from the set of closed-ended questions was analysed, using SPSS. Before the actual analysis of data using SPSS, data was cleaned, edited, checked for accuracy and coded. These processes are essential to ensure that the collected data is systematically organised in a manner that facilitates analysis (Kothari 2004: 122, Mugenda and Mugenda 2003: 115).

Data editing and cleaning was followed by data coding. Data coding transformed raw data into symbols that could be tabulated and counted (Ngulube 2003: 229). To permit quantitative analysis, data was converted to numerical codes representing attributes or measurements of variables (Mugenda and Mugenda 2003: 116). SPSS 15 was used for coding and analysing data from this study.

4.10.2 Analysing qualitative data with Nvivo

Qualitative data for this study was analysed using the NUD.IST Vivo (Nvivo) software package. Nvivo is a qualitative data analysis software package which is designed for handling data that is not easily reduced to numbers. This software was considered useful for this kind of study (case study), because most of the data was qualitative. For the purpose of this study, processes such as arranging the data, reflecting on the data, learning from the data and making sense of the data were carried out concurrently with the data collection process. Data was typed, transcribed where applicable, and imported into the Nvivo software periodically for preliminary analysis, as the data collection process was in progress. This was important

because, in qualitative research, data-making and analysis are simultaneous stages, with new analytic steps informing the process of additional data collection and new data informing the analytic processes (Lyn 2005).

A more rigorous qualitative data analysis was carried out after all the data was collected. Computer Assisted Qualitative Data Analysis (CAQDAS) as was done in the present research using Nvivo software, is considered important, as it serves to facilitate an accurate and transparent data analysis process, whilst also providing a quick and simple way of counting who said what and when, which, in turn, provides a reliable, general picture of the data (Welsh 2002; Walsh 2003). Welsh (2002) suggested that it is important that researchers recognise the value of both manual and electronic tools in qualitative data analysis and management. In this study, manual methods such as content analysis were also applied, where necessary.

All the data from the focus group discussion was analysed using Nvivo software. Focus group data was collected from community members in all the four telecentres visited. Two focus group discussions were conducted at each site. Table 4.4 shows the group sizes, gender and composition of all the focus group discussions conducted. The average group size was seven.

Table 4.4 Analysing focus group discussion data

Focus Group Discussions (FGD)		**Sengerema**		**Magu**		**Karagwe**		**Ngara**	
		FGD1	**FGD2**	**FGD 1**	**FGD2**	**FGD1**	**FGD2**	**FGD1**	**FGD2**
Group size		5	8	8	7	7	7	8	6
Gender	**Male**	2	4	2	5	5	4	4	4
	Female	3	3	6	2	2	3	3	3
Group composition	**Farmers**	2	4	5	5	4	3	2	2
	Artisans	1	2	3	-	-	-	3	1
	Professionals	2	-	-	-	-	4	-	-
	Business people	-	-	-	2	3	-	3	3

In Sengerema, Karagwe and Ngara, the focus group discussions were conducted on the premises of the telecentres. In Magu the focus group discussions were conducted at the nearby villages of Bubinza A and Bubinza B, where there were farmer groups linked to the CROMABU telecentre. The discussions lasted for one hour and they were conducted by the researcher with the help of a research assistant, who assisted with taking notes during the discussions.

The Nvivo software was used for coding, analysing and interpreting the focus groups' data. All the discussions were recorded, using a digital tape recorder. The files were later transferred to the computer and transcribed into a Word document. The whole transcription resulted in 50 pages of Word document.

An Nvivo project was created, in the Nvivo software where all the transcribed data, observations and ideas were stored and later linked together. The project had a database for rich-text documents, which were imported into the Nvivo software. The transcribed data documents on the Nvivo project, as well as the original tapes, were reviewed several times and comments made by the respondents were compared until themes emerged. The themes and all the information pertinent to answering the research questions, were used to create Nvivo nodes.

Creation of nodes is an important step in the analysis of qualitative data using the Nvivo software. Nodes were created to summarise, reduce and simplify the data. In Nvivo a node is defined as a container for categories and coding of the data. In Nvivo nodes can represent themes, concepts, processes, people, abstract ideas, places or any other categories in the project. Nodes are therefore the route by which coding is undertaken. There are three types on nodes in Nvivo. They are free nodes, tree nodes and case nodes. For the purposes of the present study only free nodes were used.

The next step after creating the nodes was the actual coding of the data. In Nvivo terms coding is defined as a process of marking passages of text in a project document with nodes. In other words, coding is carried out by applying nodes to segments of text.

After coding all the data, 63 nodes were created. At this point it was important to condense the list and merge related codes. Codes were merged, resulting in five themes, which provided information relevant to answering the research questions. The themes were:

- Access to ICTs;
- ICTs use patterns;
- Impact of ICTs on livelihoods;
- Barriers to the use of ICTs; and
- Problems associated with the use of ICTs.

All the themes are discussed in detailed under each relevant research question in Chapter Five.

4.11 Ethical considerations

Ethical considerations represent a moral stance that involves conducting research to achieve not just high professional standards of technical procedures, but also respect and protection for the people actively consenting to be studied (Payne and Payne 2004). According to Busha and Harter (1981: 25), professional ethical standards should be noted during all phases of the research process.

Some of the ethical considerations in any research process are the following: protecting the confidentiality of human subjects, following proper procedures to gain access and acceptance to instructions and organisation where research is to be conducted, reporting procedures and findings as accurately as possible, obtaining informed consent from the respondents, giving credit to research associates who provided direct evidence and placing a high value on intellectual honesty (Cohen, Manion and Morrison 2000: 50; Babbie and Mouton 2001: 120; Busha and Harter 1981: 25; Leedy and Ormrod 2001: 107).

Throughout this study the researcher strived to adhere to ethical research considerations and professional guidelines. This involved avoiding acts of misconduct in research, such as data fabrication, falsification and plagiarism. The researcher ensured that relevant research permits were obtained before the commencement of data collection. During data collection the researcher explained the aim and significance of the study to respondents, in order to get their consent. The information collected was treated confidentially and was used purely for research work. The informants' identification was protected by making them anonymous in the final report. The questions that respondents were being asked were carefully structured, to avoid questions that might embarrass and/or annoy the respondents.

The University of KwaZulu-Natal research ethics policy was adhered to. The researcher received ethical clearance for the project and complied with the University's code of conduct for research throughout the study.

4.12 Evaluation of research methods

To evaluate is to judge or calculate the quality, importance, amount or value of something. Research methods have to be evaluated in order to explain what information was required, how it was procured more accurately and more cheaply and how it was analysed (Ngulube 2005: 139). The methodological shortcomings and the limitations of the research design have to be considered. The procedures and instruments used to execute the study have to be acknowledged.

The purpose of the present research was to investigate how, and for what purposes, ICTs were used by people in selected rural areas of Tanzania. The purpose was also to investigate the impact that ICTs had on the various aspects of their livelihoods. The investigation was carried out using ICT services provided by the telecentres and mobile phone services.

The study employed the case study research design, with a combination of qualitative and quantitative methods of data collection. Structured interviews, semi-structured interviews, focus group discussions and observation techniques were used for data collection, as explained in section 4.6 of this chapter.

The case study methodology, with triangulation of data collection instruments, proved useful, as it enabled the researcher to collect reliable and verifiable data. The use of interviews and the observation checklist provided checks and balances for the data collected. The observation checklist enabled the researcher to verify data obtained during interviews. In certain cases, the observation data contradicted with the data collected from the interviews. In the same way, interviews with managers of the telecentres provided data that clarified some of the information provided by the users of the telecentres. This phenomenon coincides with what Yin (2004: 100) said, that the more the case study relies on different types of evidence that triangulate or converge on the same findings the stronger it will be.

One of the most problematic issues faced with the case study approach is the lack of strong external validity. External validity refers to the degree to which the results can be generalised to the wider population (Cohen, Manion and Morrison 2007: 136). It is concerned with the question of generalisability of the findings beyond the study itself. Case study data is usually based on a small sample, compared to other strategies such as survey. In response to the challenges faced by the case study methodology, the researcher adopted various strategies. The elements adopted in the methodology lessen the negative impact of problems faced by case study research methodology.

Silverman (2001: 300) defined generalisability as that characteristic of research which permits generalising from particular cases to the population. Gomm *et al.* (2000), cited in Bryman (2004: 137), advised that researchers can improve the empirical generalisability of the case study by:

- Providing evidence about the "fit" or key characteristics between the sample and the whole population.
- Using a systematic selection of cases to ensure that cases are typical of the population because too often cases are chosen on a convenience basis only.

The cases for this study (telecentres and communities around them) were selected using some pre-determined criteria of location, maturity of the telecentre, services offered and mode of operation. Through these criteria it was possible to get a sample which was a representative of

fully operational telecentres located in rural areas of Tanzania. Therefore, cases for this study were not chosen on a convenience basis only.

The study adopted a non-proportional quota sampling technique in selecting respondents in each telecentre (case). The population was stratified according to various economic activities dominant in each area, such as farming, livestock-keeping, small-scale business, fishing and small-scale mining activities. The respondents were selected from each of these strata. This enabled the researcher to select respondents who were representative of the major characteristics of the population, economically.

To further address the question of generalisability of the results, this study adopted a multi-case design, in which four cases were used. Yin (2004: 69) explained that where the study consists of two or more cases (multi-case) such a design can form a stronger platform for the findings than if one had relied on only a single case. Yin (2004: 70) emphasised that with more than one case it effectively counters claims that the findings are unique to the particular case. The data collected in the present study reflect a natural variation and accounts for differences among the cases, which made the result more robust.

However, even with the use of a multi-case in a case study, the extent to which case study research lends itself to generalisation is still a matter of debate. Willig (2001: 74) cautioned that case study researchers need to be very careful about the way in which they generalise from their work. Therefore, for the purpose of this study, generalisability of results was mainly theoretical rather than statistical. This means that the result of this study gave rise to some theoretical insight, which might be generalisable to other similar cases.

4.13 Summary

Chapter Four presented the research design of this study. It described the population and the sampling procedures that were used. Data collection methods used in this study were discussed in detail and the reasons given as to why each instrument for data collection was selected. Validity and reliability issues and ethical standards, which informed the research process, were presented. Problems encountered during data collection and the evaluation of

the methodology used to carry out the study was presented. The chapter discussed data analysis procedures. Chapter Five will present the results.

CHAPTER FIVE

DATA PRESENTATION

5.1 Introduction

This chapter presents the empirical data derived from the structured and semi-structured interviews, focus group discussions and observation technique. The structured interviews were conducted with users and non-users of telecentres (see Appendix 4.1), as well as managers of telecentres (see Appendix 4.4). The chapter presents data derived from semi-structured interviews which were conducted with the personnel responsible for telecentre projects from TCRA, COSTECH and from the national ICT co-ordination office at the ministry responsible for ICTs in Tanzania, the then MoID (see Appendix 4.5, 4.6 and 4.7, respectively). The chapter presents data that was derived from applying the observation checklist (Appendix 4.3) and from focus group discussions (Appendix 4.2). Chapter Four explained how the study was conducted and the methods which were used to conduct the study.

In Chapter Five, data is categorised according to specific objectives and research questions that the research attempted to answer. Presentation of data in this chapter does not follow the sequence in the interview protocol, the observation checklist or other instruments. Instead data from these instruments that address a particular research theme, in relation to the study objectives, are presented together. Data from different sources that answer the same research question is presented together

Creswell and Clark (2007: 128) elucidated that data analysis in mixed methods research consists of analysing the quantitative data using quantitative methods and the qualitative data using qualitative methods. A large fraction of the data derived from interviews with users and non-users of telecentres was of a quantitative nature. This data was analysed using SPSS and it was presented in graphic and tabular form. Both tables and figures were used so as to have a variety in the presentation of data. Percentages were rounded to one decimal place. Before data was entered into the SPSS software it was cleaned and coded by assigning numerical values.

The data from semi-structured interviews and focus group discussions was qualitative in nature and it was analysed with the use of Nvivo software. The data was organised, transcribed and then qualitative data coding was done using Nvivo software, whereby data was organised around themes and presented in a descriptive manner. In certain cases, phrases and terms used by respondents are indicated.

The purpose of this study was to investigate how, and for what purposes, ICTs were used by people in selected rural areas of Tanzania and the impact of ICTs on the various aspects of their livelihoods. In order to realise this general purpose, the following specific objectives were outlined for the study:

1. To establish the current status of ICT sector development in selected rural areas of Tanzania.
2. To determine policies which are in place to facilitate development and utilisation of ICTs in the selected rural areas of Tanzania.
3. To examine the extent to which people in the selected rural areas of Tanzania have access to ICTs.
4. To examine use patterns of ICTs by people in the selected rural areas of Tanzania.
5. To determine the impact of ICTs use on various aspects of the livelihoods of the people living in the selected rural areas of Tanzania.
6. To identify barriers to effective utilisation of ICTs in the selected rural areas of Tanzania.
7. To recommend a model for effective implementation of ICTs and their use for sustainable livelihoods in the selected rural areas of Tanzania.

Based on the objectives above, the study formulated research questions and possible sources of data, as detailed in Appendix 4.8.

5.1.1 Generalisation of the study

Due to the fact that qualitative research was applied as a dominant paradigm in conducting this study, the samples for each district were not randomly selected. The study actively sought to include users and non-users of ICTs in all four sites. The profile of respondents in this

research (that is, their characteristics and their ability to use ICTs) is not representative and might be higher than that of Tanzania as a whole, and/or in the rural communities where the research was conducted. The study sought to include respondents who were actively involved in various economic activities. Therefore, most of the respondents were relatively young, had some form of income and had more access to ICTs. Most of the characteristics of the respondents, such as levels of ownership of mobile phones and use of telecentres services, are not representative of rural communities in Tanzania. The study cannot be generalised to all rural communities in Tanzania.

5.1.2 Characteristics of respondents

Identifying the characteristics of the respondents was not part of the specific objectives of the study. However, it is necessary to present this data for the reader to understand the background of the respondents. Characteristics of the respondents provide a snapshot on the suitability of the respondents for the study. They also provide information on how well the respondents represented the characteristics of the users and non-users of the telecentres and hence provided appropriate background information for the presentation of the findings of the study.

Understanding the background of the respondents would shed some light on the factors that influence use or non-use of ICTs by the respondents. Data for this objective was obtained from structured interviews with users and non-users of telecentres (see Appendix 4.1). The characteristics of the respondents were described in three categories (see Appendix 4.1). These were:

- Personal data – covers age, gender, level of education and occupation.
- Household data - includes the relationship of the responds to the head of the household, number of people living in the household and the extent to which the household depends on support from family members living elsewhere.
- Economic status - includes the principal source of income for the household and housing quality and characteristics. It also includes ownership of land, livestock and other things.

5.1.3 Personal data: age, gender and literacy level of the respondents

Table 5.1.1 shows age, gender and literacy levels of the respondents at the four research sites.

Table 5.1.1: Age, gender and literacy level of the respondents

Demographic Data	Sengerema	Magu (CROMABU)	Karagwe (FADECO)	Ngara
Respondents interviewed (N)	53	60	40	50
Mean age	28	29	29	28
Male: Female ratio	31(58%) : 22(42%)	30(50%) : 30(50%)	26(65%) : 14(35%)	28(56%) : 22(44%)
Literacy: Illiteracy ratio	51(96.2%) : 2(3.8%)	58(96.7%) : 2 (3.3%)	39(97.5%) : 1(2.5%)	49(98%) : 1(2%)

The mean age of respondents was 28 for Sengerema, 29 for Magu, 29 for Karagwe and 28 for Ngara. The study chose respondents who were actively involved in various economic activities. This means that the respondents chosen were relatively young and economically active. Since the respondents were selected using non-probability sampling techniques, efforts were made to include both sexes during selection. The number of women interviewed was slightly lower for Karagwe, Ngara and Sengerema, as shown in Table 5.1.1. The respondents were asked whether or not they knew how to read and write. Literacy levels in terms of the ability of the respondents to read and write in the national language (Swahili) were quite high at all the sites. (see Table 5.1.1).

5.1.4 Level of education

In question 1.4 (Appendix 4.1) respondents were asked if they had received formal education. This question required the respondent to provide a ‘yes’ or a ‘no’ answer. The results were that 51 (96.2%), 57 (95.0%), 35 (87.5%) and 49 (98.0%) of the respondents had received formal education in Sengerema, Magu, Karagwe and Ngara, respectively (see Table 5.1.2). Those who received formal education were asked to indicate the highest level of education they had achieved, by choosing one of the six categories provided in question 1.5. Different

levels of education achieved by the respondents in Sengerema Magu, Karagwe and Ngara district are shown in Table 5.1.2.

Table 5.1.2: Levels of education of the respondents

Level of education	Sengerema	Magu (CROMABU)	Karagwe (FADECO)	Ngara
Primary education	33 (62.3%)	49 (81.7%)	23 (57.5%)	34 (68.0%)
Lower secondary education	12 (22.6%)	5 (8.3%)	8 (20.0%)	4 (8.0%)
Senior secondary education	-	-	-	7 (14.0%)
Post secondary education	5 (9.4%)	3 (5.0%)	3 (7.5%)	2 (4.0%)
Adult education	1 (1.9%)	-	1 (2.5%)	2 (4.0%)
Have never gone to school	2 (3.8%)	3 (5.0%)	5 (12.5%)	1 (2.0%)
TOTAL	**53 (100%)**	**60 (100%)**	**40 (100%)**	**50 (100%)**

5.1.5 Occupation of the respondents

In question 1.7 respondents were asked to state their occupation or the economic activities that they were predominantly doing to earn a living. This was an open-ended question and various economic activities were given by the respondents. These activities were later grouped into seven categories, by putting together related activities. This was done for the purposes of coding and simplifying the data. The categories were small-scale business people, artisans, performing artists, fishermen, farmers and livestock-keepers and others. A separate category was created for students and people from the formal employment sector. Details of the seven categories are given below. The distribution of the respondents into the various categories is shown in Table 5.1.3.

Small-scale business - Include businesses such as retail shop owners, food Vendor, secretarial services shop owners and mobile phone air-time vouchers re-sellers

Artisans	-	Include carpenters, dress-makers (tailors), metal and iron fabricators, shoe-makers and repairers and bicycle repairers
Performing artists	-	Include local musicians, local drama actors, traditional dancers and acrobats
Fishermen	-	Mainly small-scale, using very simple fishing equipment.
Farmers and livestock-keepers	-	Include those practising small-scale farming and livestock-keeping, mainly for subsistence
Students	-	Mainly those who were attending computer classes and internet users at the telecentre
Others	-	Include people from the formal sector, such as District Council employees, politicians, teachers, medical personnel, priests, NGO and relief agencies employees and journalists.

Table 5.1.3: Main occupation of the respondents

Main occupation of the respondents	Sengerema	Magu (CROMABU)	Karagwe (FADECO)	Ngara
Farming	11 (20.8%)	29 (48.3%)	8 (20%)	20 (40%)
Business	14 (26.4%)	8 (13.3%)	10 (25%)	11 (22%)
Fishing	1 (1.9%)	3 (5%)	-	-
Livestock keeping	-	4 (6.7%)	1 (2.5%)	_
Artisan	12 (22.6%)	7 (11.7%)	7 (17.5%)	6 (12%)
Student	6 (11.3%)	2 (3.3%)	6 (15%)	5 (10%)
Performing arts	4 (7.5%)	2 (3.3%)	1 (2.5%)	-
Others	5 (9.4%)	5 (8.3%)	7 (17.5%)	8 (16%)
TOTAL	**53 (100%)**	**60 (100%)**	**40 (100%)**	**50 (100%)**

The economic activities that the respondents performed were further divided into the formal and informal sectors. Results are shown in Table 5.1.4.

Table 5.1.4: Main occupation of the respondents: formal versus informal sector

Occupation of the respondents	N	Informal sector		Formal sector	
		Number	%	Number	%
Sengerema	53	48	90.6	5	9.4
Magu	60	55	91.7	5	8.3
Karagwe	40	33	82.5	7	17.5
Ngara	50	42	84	8	16

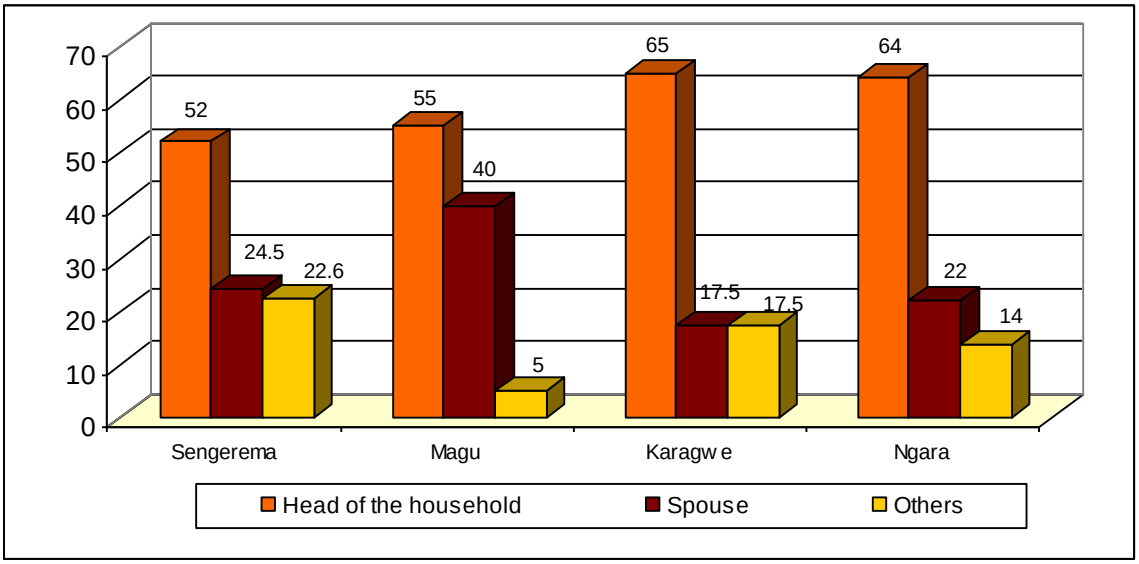
5.1.6 Household data

Household data included the relationship of the respondents to the head of the household, the number of people living in the household and the extent to which the household depended on support from people living elsewhere. This is covered in section two (Questions 2.1 to 2.3). See Appendix 4.1.

5.1.7 Relationship to the head of the household

The aim of question 2.1 was to determine the position of the respondents in terms of household relationships, which may influence the ability of the respondent to authentically speak on behalf of the household. As shown in Figure 5.1.1, the majority of the respondents interviewed were heads of the household. Both male and female heads of the household were interviewed and they constituted the majority of the respondents. However, in some instances spouses and other senior members of the households, termed as “others”, were also interviewed.

Figure 5.1.1: Relationship of the respondents to the head of the household



N=Sengerema 53, Magu 60, Karagwe 40, Ngara 50

5.1.8 Household size

Question 2.2 required the respondents to indicate the number of people regularly living in the household. This information was processed to determine the average size of the households at each research site. The mean household size for Sengerema, Magu, Karagwe and Ngara were found to be 5.5, 6.4, 5.1, and 5.6, respectively.

5.1.9 Household dependence on relatives living elsewhere

In question 2.3 the respondents were asked to indicate the extent to which their families depended on support from family members living elsewhere. Results in Table 5.1.5 show that few families were highly dependent on support from relatives living elsewhere.

Table 5.1.5: Household dependence on relatives living elsewhere

Household dependency	Sengerema	Magu (CROMABU)	Karagwe (FADECO)	Ngara
Not at all	27 (50.9%)	23 (38.3%)	24 (60%)	24 (48%)
Moderately	23 (43.4%)	33 (55.2%)	12 (30%)	24 (48%)
Highly	3 (5.7%)	4 (6.5%)	4 (10%)	2 (4%)
TOTAL	**53 (100%)**	**60 (100%)**	**40 (100%)**	**50(100%)**

5.1.10 Economic status and ownership of household assets

Data concerning the economic status of the household includes the principal source of income for the household, ownership of land, livestock and other things. The results on the ownership of household and personal assets and utilities are shown in Table 5.1.6.

Table 5.1.6: Ownership of household assets and utilities

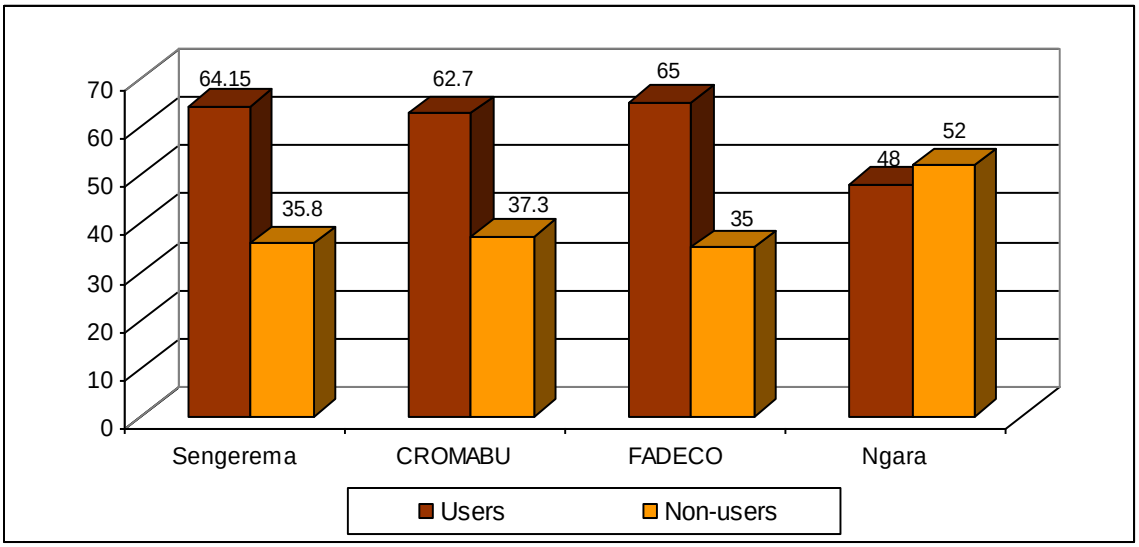
Household assets	Sengerema	Magu (CROMABU)	Karagwe (FADECO)	Ngara
Protected water	21 (39.6%)	10 (16.7%)	15 (37%)	19 (38%)
Electricity (grid)	26 (43.4%)	9 (23%)	17 (42%)	27 (54%)
Television	22 (42%)	9 (15.5%)	14 (36.8%)	9 (21.4%)
Radio	53 (100%)	53 (91.4%)	37 (97.4)	35 (83.3%)
Fixed telephone	3 (5.7%)	1 (1.7)	1 (2.5%)	0
Mobile phone	35 (52.8%)	39 (64.4%)	33 (82.5%)	32 (64%)
Computer	3 (5.2%)	3 (5.%)	6 (15.8%)	7 (14.7)
Bicycle	24 (46.2%)	36 (62.1%)	13 (34.2%)	10 (23.8%)
Car/motorbike	6 (11.5%)	4 (6.9)	5 (13.2%)	7 (16.7%)
Tractor	1 (1.9%)	-	-	1 (2.4%)
Truck	1 (1.9%)	-	-	-

(Note: This was a multiple response question)

5.1.11 Access to the services of the telecentres

As explained in Chapter Four of this study, users of the telecentres were defined as those who benefit directly from the telecentre, such as those who had a direct contact with the telecentre and those who had visited the telecentre in search of a particular service or type of information. Non-users were defined as those people who had never visited the telecentre or used any services offered by the telecentre. It includes those who had no direct contact with the telecentre. Figure 5.1.2 shows the percentage of user and non-users at all four research sites.

Figure 5.1.2: Users and non-users of the telecentres



N=Sengerema 53, CROMABU 60, FADECO 40, Ngara 50

5.2 Current status of ICT sector development in the selected rural areas of Tanzania

In answering this research question, data on the current status of ICT sector development for each of the four districts visited is presented separately, starting with Sengerema district, then Magu district, then Karagwe district and finally Ngara district. The current status of the various aspects of the ICT sector and other infrastructure necessary for effective functioning of the ICT sector was studied. These were electricity supply, condition of the roads, fixed telephone services, mobile phone services, radio and television services, internet services and other services offered by the telecentres.

5.2.1 Sengerema district

The following section provides an analysis of the current status of ICT sector development in Sengerema. Different ICTs and their availability in the district are described. The condition of roads and the availability of an electricity supply in the district are also presented. The information provided below came from observation, documents collected from the Sengerema Multipurpose Community Telecentre and Sengerema district council office, interviews with managers of telecentres and informal talks with other key personnel in the district.

5.2.1.1 Access to electricity supply and condition of the roads

In Sengerema district only the district headquarters is supplied with hydro-electricity from the national grid. The rest of the district does not have electricity. The use of other sources of energy, such as solar power, biogas and diesel or bio-fuel generators is very low, almost non-existent in the district. The main reason for this is the high initial cost of such sources of power, which many people cannot afford. Only 9.9% of 501,915 people in the Sengerema district have access to electricity. The percentage was calculated from Sengerema district socio-economic profile (Sengerema District Council 2006).

The main access to Sengerema is via a ferry across Lake Victoria and thereafter a 150 kilometre road to Sengerema. The road going to Sengerema and other roads joining different parts of Sengerema district are not tarmacadamised**.** According to the district socio-economic profile (2006), only 10.6% of all the roads in Sengerema are passable throughout the year. Most roads are not passable during the rainy season, where they are either flooded with water or ruined by the rainwater.

5.2.1.2 Fixed telephone services

Fixed-line telephone services in Sengerema are provided by Tanzania Telecommunication Company Limited (TTCL). TTCL services are mainly available at the district headquarters. According to the manager of the telecentre, the TTCL switching system was upgraded with funding from the Sengerema Multipurpose Community Telecentre. The old, manual and operator-based switching system was replaced with a new Subscriber Trunk Dialling (STD) switching system in 2000. The new STD system allows subscribers to dial trunk calls directly, without the assistance of an operator. The upgrading of the TTCL switching system resulted in improved overall telephone services in the district. It also eliminated the inefficiency of the old system, which was associated with long queues and prolonged waiting times for calls to go through.

The TTCL has two telephone booths, one at their offices and the other at the telecentre premises (the one at the telecentre was not working during the time of this research). The

usage of telephone booths is very low because of the sudden increase in the availability of mobile phones.

5.2.1.3 Mobile telephone services

Mobile telephone services were provided by three mobile phone companies in Sengerema. These were Vodacom, Celtel and Tigo. The three companies had their masts at the district headquarters. Their services were mainly available at the district headquarters. In other places, beyond the district headquarters zone, mobile phone services were available but in most cases the network was patchy and not reliable.

The district also had mobile-based public phone services. Popular among these is a metal container housing six telephones connected to Vodacom's mobile network, known in Swahili as "*Simu ya watu*" - literally meaning the "people's phone". In this container, people make metered calls on Vodacom mobile network. Due to lack of electricity in many places in the district, mobile phone battery-charging services were provided from this Vodacom container. People came from as far as 80 kilometres away to charge their phones at the containers. The cost of charging a mobile phone in Sengerema ranges from TSh. 300 to 500 (25 to 42 US cents).

The district had a number of individual entrepreneurs who provided mobile phone services. These individuals set up make-shift mobile phone centres where people buy air-time vouchers, recharge their phones and, most importantly, make telephone calls at a fee. Unlike "*Simu ya watu*", these make-shift mobile phone centres were not licenced by any mobile operators and were run by people who simply had a mobile phone in their hand.

Air-time vouchers were available mainly at the district headquarters. In other places outside the district headquarters, air-time vouchers were available, but at an additional cost. For instance, a TSh.1000 (83 US cents) air-time voucher cost Tsh.1200 (1 US dollar) outside the district headquarters.

5.2.1.4 Internet services and other telecentre-based services

The Sengerema Multipurpose Community Telecentre was the only place in the Sengerema district that provided internet services to the public. The telecentre was managed through a project management committee composed of members from the international partners, national partners, chairman of the local steering committee and project manager. The day-to-day activities were managed by a local steering committee composed of members from the Sengerema community, COSTECH, UNESCO Commission of Tanzania, TTCL and the project manager. Supervision of the daily activities is the responsibility of the project manager. The current manager of the Sengerema Multipurpose Community Telecentre is Mr. Felician Nchenge, who is trained in business administration, marketing research and computer applications.

The telecentre provided the community with access to various ICT services. These were: computer training programmes, public internet access, secretarial bureau, community radio, IT-consultancy, video shooting and conference facilities with video and data projecting facilities. The telecentre is operating as a local internet Service Provider (ISP).

At the time of this research, the telecentre had the following kinds of hardware: twenty working computers, three printers, one large photocopier machine, one scanner, one television set, a Video Cassette Recorder (VCR), data projector, lamination machine and spiral binding machine. The telecentre had a broadcasting studio for the Sengerema community radio.

According to the manager of the telecentre, the computer training programme is the most important service of the telecentre. This is in terms of the amount of income it generates and the fact that it is the most utilised service at the telecentre. Computer training classes were normally composed of young people. The majority of these young people were students and staff from local government offices in Sengerema and other institutions, including the NGOs. There were two categories of young people who came for training. The first is secondary school students, who were continuing with their studies. They wanted to be computer literate as this helps them in their studies. The second is the group of primary or secondary school-leavers who came for training to acquire skills to enable them to get a job.

Those who graduated from the telecentre were awarded a certificate which is recognised by the government and many other employers. The telecentre helped them secure employment whenever possible. Employers normally came to the telecentre to look for people with computer knowledge. Some of the graduates had been employed by the mining company in the nearby district of Geita. Others had been employed by private people with secretarial services businesses in the district.

An internet service in the telecentre was provided by means of Very Small Aperture Terminals (VSAT) connection through an internet service provider based in Dar es Salaam. As a way of sustaining its services, the telecentre has been operating as an Internet Service Provider (ISP) since 2004. By the time of this research, the telecentre had supplied internet services to Sengerema district council offices and Sengerema Secondary School. These two places are located about five kilometres from the telecentre. Therefore they had been connected using a fibre optic cable. Plans were underway to connect the district hospital in Sengerema. The telecentre is open everyday from 08: 00 hours to 18: 00 hours, including Saturdays and Sundays.

Sengerema telecentre was involved in selling refurbished computers to institutions and individuals at a reduced price. So far, the telecentre has received 293 computers from Jireh Technology Solutions, Texas, United States of America (USA). The telecentre also received 30 computers from Computer Aid International (CAI).

5.2.1.5 Radio and television

Sengerema district has one community radio station, which is owned by the Sengerema Multipurpose Community Telecentre. The radio started broadcasting in 2003. It is currently covering 60% of the district, because the antennas for the radio were not located at a strategic hilly place to cover the whole district. However, the aim of Sengerema community radio was to cover the whole district. At the time of this research the management of Sengerema telecentre was in negotiations with a mobile phone company, Celtel, so that the community radio could use the Celtel mast for its antennas through an arrangement called ‘mast sharing’.

Mast sharing occurs when the antennas of the two operators or, in this case Celtel and Sengerema community radio, are put on the same mast. This arrangement was important for Sengerema community radio as it reduced the cost of building a new mast for its antennas. The Celtel mast is located at Igogo Hills in Sengerema.

According to the manager of the telecentre, the main purpose of the Sengerema community radio was to report local news of what was happening in the community and the whole district of Sengerema. The second purpose was to report all developmental activities taking place in the community. Reporting local news and what was happening in the district was one unique thing that had made Sengerema community radio very popular. This was because most of the other national and regional radios had not been able to capture local stories and news.

Apart from local news, the radio had other programmes that aimed at raising awareness of the telecentre and ICTs in general. Such programmes are "*Ijue telecentre*" literary, rendered as "know the telecentre" and the "*Mambo ya internet*," rendered as "internet issues", were very educational and informative. In these programmes, the presenters raise certain themes or topics relevant to the community; they searched the relevant information about themes on the internet and presented it on the radio in a local language (Swahili).

Other programmes that are aired include health, environment, women's and children's programmes, religious programmes, speeches of politicians and programmes for primary school children. Sengerema community radio re-broadcasts Swahili programmes (especially news) from Radio Tanzania Dar es Salaam (RTD) and Radio Deutsche Welle of Germany.

The radio, however, had very few programmes that target farmers or livestock-keepers, who are the majority in the district (90% of all the people in Sengerema are farmers). The radio was dominated by entertainment, music and social programmes. Interviews with the manager and other staff of the telecentre indicated that the radio has programmes that target farmers. However, the schedule of Sengerema community radio which was obtained from the telecentre does not show any such programmes.

The Sengerema community radio is used by various people in Sengerema. The business community in Sengerema used the radio to advertise their business within the district. This was mainly the case for businesses such as restaurants and retail shops. All members of the Sengerema community use the radio to broadcast various items such as children and relatives who went missing. This is a common occurrence in Sengerema and the radio has played a big role in locating children and individuals who had gone missing. Sengerema community radio has also played a role in locating missing livestock such as cows or goats and sending urgent messages such as death and funeral announcements, weddings and other social events.

The radio broadcast is used by the community to exchange greetings to friends and family members within the district. Such messages were normally send to the studio via cards or mobile phone SMS. The telecentre itself uses the radio broadcast to raise awareness of the telecentre among the people. For instance, sometimes the telecentre offers free classes to various groups of people in the society, such as the youth, the disabled or old people. Such offers were advertised on radio. The Sengerema Local Government used the radio to enlighten the community on various regulations and civic practices such as voting, human rights and proceedings of District Local Council meetings.

Some of the concerns raised by the people of Sengerema about their community radio are:

- In presenting local news, most of the time there is repetition and it becomes difficult to follow and understand the story being presented;
- Small area coverage by the radio signals;
- The presenter makes many errors in pronouncing words and peoples' names, thereby making the radio less appealing to listeners;
- Sometimes the news is not presented accurately that is it does not relate the story as it actually happened. Such things jeopardise trust that people have in the news broadcast by the radio; and
- One respondent who belonged to an NGO that deal with human rights advocacy in Sengerema said that the information gap is so big in Sengerema because much useful information that may benefit the people is with NGOs. These NGOs want to share the information with the people, but they cannot use the radio because of the high costs charged for airing programmes.

Sengerema community radio broadcasts for nine hours a day, from 13:00 hours to 22:00. On weekends, the radio operates for ten hours. This was mainly due to the low capacity of the available transmitters. The telecentre was planning to improve the situation. During the time of this research the management of the telecentre was dealing with procedures involved in purchasing additional transmitters. The major challenge that the radio was facing is frequent interruptions in the radio programmes due to power cuts. By the time of this research, the telecentre did not have a stand-by generator or an alternative source of power to be used during power cuts. The telecentre is planning to have a community television station in the future.

5.2.2 Magu district

The following section provides an analysis of the current status of ICT sector development in the Magu district. Different ICTs and their availability in the district are described. These include the availability and accessibility of fixed telephone services, mobile phone services, radio and television services, internet services and other services offered by the telecentres. It also includes the condition of the roads and the electricity supply.

The information provided in this section came from observation, documents collected from CROMABU telecentre and local newspaper articles about the telecentre. The information also came from the Magu district office, interviews with managers of telecentres and informal talks with other key personnel in the district.

5.2.2.1 Condition of roads and electricity supply

The district of Magu is located at about 60 kilometres from the Mwanza Municipality along the Mwanza - Musoma main road. Roads are the major means of transport inside and outside the Magu district. The Mwanza - Musoma highway is the only road in the district which is passable throughout the year. The rest of the district and feeder roads are only usable for less than half of a calendar year and they are not tarmacadamised (Magu District Council 2006). The Magu district has a population of 415, 005 (URT 2002b).

The Magu district is served with hydro-electricity from the national grid. However, this electricity only serves the district headquarters and a few trade centres. The Magu district headquarters has a population of 17,689, which is equivalent to 4.3% of the total population in the district and this represent the percentage of Magu residents with access to electricity (National Bureau of Statistics 2003). The rest of the district had no access to a electricity supply. As with other district headquarters in Tanzania, Magu district headquarters is a centre of many activities, especially non-agricultural informal sector activities such as small-scale businesses and artistic works such as handicrafts.

5.2.2.2 Fixed telephone services

Fixed telephone services in Magu were provided by TTCL, whose services were mainly available at the district headquarters. The TTCL office in Magu provided various fixed-line telephone services, including broadband internet services. At the time of this research, TTCL was providing internet services to three NGOs in Magu and a few individuals.

The TTCL had two public phones in the district. One was located at TTCL offices and the other at the bus stand. The one at the bus stand was out of order at the time of this research. CROMABU had a telephone line connected to TTCL, which was meant to provide public access to telephone services. However, this phone had not been used for sometime. The author never saw anybody using it during the time that she was there.

5.2.2.3 Mobile telephone services

The Magu district enjoys the services of three mobile phone companies. These are Celtel, Vodacom and Tigo. The services of these mobile phone networks were mainly provided at the district headquarters. In other places, outside the district headquarters, mobile phone services were provided, but in most cases the network was patchy and hardly reliable. The district had a number of individual entrepreneurs who sold air-time vouchers, set up public phone spots and provided mobile phone battery-charging services.

Re-charging mobile phone batteries was a challenge for mobile phone users in areas of Magu where electricity was not found. In most cases people travelled as far as 100 kilometres to the district headquarters to charge their mobile phone batteries. In the nearby village of Bubinza, a local hairdresser had a mobile phone battery charging service using a car battery. People charged their phones here for TSh. 500 shillings (42 US cents).

5.2.2.4 Radio and television

In the case of television, terrestrial television signals were generally weak in Magu. Therefore the few people who could afford it opted for satellite television. Because of the high initial cost of using satellite television, some people have opted for cable television. This service was being provided by a local entrepreneur who supplied satellite television services to subscribers via a cable. Cable television is a system of providing television to consumers via radio frequency signals transmitted to televisions through fixed optical fibres or coaxial cables. This is contrary to the over-the-air method used in traditional television broadcasting (via radio waves), in which a television antenna is required. Cable television services originated in the USA in 1948 and were later used on a large scale in Europe, Australia and Asia. They were commonly used in areas where over-the-air reception was limited by mountainous terrain. Ideally, these countries constructed large "community antennas", from which cables were run, to supply individual homes (Seiden 1992). In Africa cable television has had little success as it is not cost-effective to lay cables in sparsely populated areas (Africa media development initiative 2005).

In the case of Tanzania, there is a rapid increase in the number of cable television operators throughout the country. So far, the regulator (TCRA) has licenced a total of 32 cable television operators (TCRA 2006). The cable operator service in Magu operated on a very small-scale. The services were limited to an area of 800 metres circumference. The operator had a number of satellite dishes that were used to access the signal. The signal is then distributed to subscribers through a coaxial cable that runs from one house roof to another and from one tree to another. Subscribers normally pay a fee of between TSh. 5,000 to 10,000 per month (4.2 to 8.3 US Dollars).

5.2.2.5 Internet services and Magu telecentre

Magu telecentre, commonly known as CROMABU telecentre by the people of Magu, was the only place that provided internet services to the public in Magu districts. CROMABU telecentre was steered by a board of directors composed of local and foreign ICT experts and business persons. It was managed by Mrs. Naomi Masele, a professional agriculturalist with experience in the management of rural agricultural and industrial projects. The manager was answerable to the board of directors, who essentially owned the project. CROMABU telecentre is located at the district headquarters. The telecentre worked with farmer groups in three other wards of Magu district which are far from the district headquarters. These are Nyigogo, Lubugu and Mwamabanza wards.

The telecentre was providing the following ICT-related services to the community: (1) internet café that served the targeted community, (2) price information services, where the cost of particular agricultural products in various markets was available, (3) computer training services and (4) community development through information and training. The telecentre offered secretarial services such printing, faxing and scanning of documents, photocopying, designing and printing of business and invitation cards. The telecentre is open from 08:00 to 17:00 from Mondays to Fridays. The closing time was not strictly observed. It depended on the availability of customers. Unlike Sengerema telecentres the telecentre this one is open from 08:00 hours to 14:00 hours on Saturday and on Sundays it remained closed.

In order to meet the objectives stated above, CROMABU telecentre collaborated with farmers groups in the three wards of Lubugu, Magu and Nyigogo. At the time of this research the telecentre was working with 47 farmer groups, with 30 members each. The groups benefited from the telecentre in two main ways, namely access to market information and access to information for market-oriented agricultural production.

5.2.2.6 Access to market information

The telecentre played a significant role in creating awareness of available agricultural market options. It collected and distributed market information to small-scale farmers. The telecentre produced a weekly market information bulletin (see Appendix 5.1), which listed prices of locally produced and sold agricultural products in the Magu district. The information, which

varied weekly, was collected from all the markets in the district, with the help of volunteers and representatives from the farmer groups. The markets were Yichobela, Nyashimba, Kinango, Sagani, Kipeja, Ilungu, Kisamba, Nsola, Lubugu, Sayaka Mwamabanza, Mwalinha, Salonwe and Soko kuu.

After the information was collected from the market centres it was brought to the telecentre, where it was compiled, type-set and printed, to produce a document which showed prices of different produces in the different markets in the district. The document was normally written in Swahili, the language that the majority of the people understand. The volunteers and representatives of farmer groups then took the information to their villages and their respective groups. This process took place every week. Prices were collected from the nearby markets in urban areas such as Mwanza city and Sirari, a border town between Tanzania and Kenya.

In the villages the information was posted at market places, shops and village offices. The representatives read the information in their farmer groups weekly meetings. In the groups the volunteers were sometimes called upon to translate the information into local languages, for example the Sukuma language. This was necessitated by the fact that some people, especially the elderly, did not understand the Swahili language. Reading the price list in the farmer groups meetings benefited farmers who could not read or write.

This whole process provided farmers with first-hand information while it was still up-to-date and could be acted upon. On the basis of this information, farmers made decisions on where to sell their products. In most cases farmers took their produce to markets, where it would fetch high prices, and bought from markets where prices were low. Armed with this information, farmers were in a better position to bargain for the prices of their produce with the middle men (intermediary traders), who normally bought agricultural produce from farmers and sold it in the markets.

Providing information that links farmers directly to markets or wholesale buyers in the markets is essential for Tanzanian small-scale farmers. This is because the marketing chain normally consists of multiple middlemen, each taking a profit margin at every stage of the

chain. Price variations in space and time are often large and erratic. The lack of market information represents a significant impediment to market access, especially for poor smallholder farmers in remote rural areas (Molony 2006a; Mukhebi 2004).

According to the manager of the CROMABU telecentre, providing marketing information to farmers by the CROMABU telecentre has not been without challenges. At the beginning of the project CROMABU trained young people who were intended to work with the project. Because the telecentre could not employ them they were easily absorbed elsewhere, given the computer literacy they already had. Consequently, the telecentre decided to work with the farmers directly, using volunteers and representatives from the farmer groups. It trained the volunteers and representatives of the farmers, who later assisted with the collection of the information and availed the information to the farmers. These volunteers and representatives were largely from the three targeted wards.

5.2.2.7 Access to information for market-oriented agricultural production

Using the network of NGOs available in the Magu district and the available communication tools at the telecentre, the telecentre has been able to locate various NGOs and government departments that deal with agriculture. After locating them, CROMABU links interested farmers groups to these institutions, with information, knowledge and expertise on the agricultural aspect of their choice. Some of the successful linkages that have been established are:

- Isandula womens group – This group showed interest in mushroom production and was linked to the Lake Zone Agriculture Research Development Institute (LZARDI) Ukiriguru, in Mwanza. These women were trained on how to produce mushrooms at the local level, using locally available resources. The group was successfully producing and selling mushrooms. Markets for the mushrooms are available locally and in the nearby city of Mwanza. The success story of these women has been widely documented in local newspapers in Tanzania, as well as on the internet.
- Several other groups and individual were linked to a local NGO dealing with improved production of indigenous chicken. As a result, the farmers were able to increase the production of their indigenous, free-range chickens.

The telecentre encouraged farmers to diversify their agricultural production from traditional cash crops to new, non-traditional, market-oriented, high-value crops. The traditional cash crop for the Magu district is cotton. In recent years, traditional export crops for Africa such as coffee, cotton, tea, cocoa, palm oil and tobacco have been subject to large price fluctuations and declining world market prices. Diversification to non-traditional cash crops is now considered as an alternative for farmers. Through encouragement by the telecentre manager, plus the information provided on the internet and the links that the telecentre have, the farmers in Magu have started producing new cash crops, which were traditionally not regarded as cash crops at all. These included fruits, vegetables and lentils.

5.2.3 Karagwe district

The following section provides an analysis of the current status of ICT sector development in the Karagwe district. Different ICTs and their availability in the district are described. The condition of roads and the availability of an electricity supply in the district are presented. The information provided in this section came from observation, documents collected from the Family Alliance for Development Co-operation (FADECO) telecentre and Karagwe district offices. The information also came from interviews with the manager of FADECO telecentres, interviews with the Karagwe district commissioner, interviews with the manager of Karagwe Media Association (KAMEA) and informal talks with other key personnel in the district.

5.2.3.1 Access to electricity supply and condition of the roads

In terms of electricity supply, only a few trading centres and the district headquarters in Karagwe have an electricity supply. This implies that approximately two percent of 424,287 of the people of Karagwe have access to the electricity from the national grid. Solar power is used by the very few people who can afford it. The demand for rural electrification in Karagwe is huge. The district electricity is connected by TANESCO from the Uganda hydro-electric power grid.

The major means of transport in and out of Karagwe district is by road. The roads linking Karagwe to other parts of Tanzania are in a deplorable condition. This has led to the district's dependence on roads from the neighbouring countries such as Burundi and Uganda: For instance, the easiest way of getting to Karagwe from Dar es Salaam by road is via Kampala in Uganda (Nguo *et al.*, 2005).

5.2.3.2 Fixed telephone services

Fixed-line telephone services in Karagwe are provided by TTCL. The service was only available at the district headquarters. TTCL had two public phones on their office premises. FADECO telecentre had a telephone line from TTCL. However, the line was not accessed by public users.

5.2.3.3 Mobile telephone services

Three mobile phone companies operate in Karagwe. These are Vodacom, Celtel and Tigo. Karagwe district borders Uganda and Rwanda on the north-western side. The district's areas near these boundaries receive mobile phone services from operators such as MTN from Uganda and Rwanda Cell. Mobile phone services were available in some very remote areas. However, in most cases, the further one went from the district headquarters the more the network became patchy and concentrated in a few places around their masts. According to the Karagwe District Commissioner, the coverage of the GSM networks in Karagwe was estimated to be about 25%. In order to make a call successfully, users had to identify certain spots where the network was available. This could be a hill or, in some instances, up trees. These "spots" have sarcastically been nicknamed by the people of Karagwe "call boxes".

A good case in point is that of one respondent who was a teacher at the Kahanga Primary School. The school is located 35 kilometres from the telecentre. On the day of the research he had come to the telecentre to access the internet and communicate with his sister who was in Germany. He had a mobile phone but where he resided and worked, at the school compound, there was no network. He had to walk six kilometres from the school to the point where there was network, the so-called "call box", in order to make calls and receive and send SMSs.

There were a few public mobile phone services, mainly provided by private entrepreneurs. Vodacom closed down their popular public phone service, commonly known in Swahili as "*Simu ya watu*" - literally rendered as "people's phone". According to the explanations of the local people and former owners of the business, the business was closed down due to the expansion of the mobile phone networks. As mobile phone penetration reached deeper into the community, people tended to use fewer of the public pay phone services.

5.2.3.4 Radio and television

The terrestrial television signal from Tanzanian television channels was completely unavailable in Karagwe. Television from Tanzanian channels were only available through satellite. Very few people in Karagwe could afford to buy and maintain a satellite dish. Another alternative way of accessing television in Karagwe was through a cable from a local cable television operator. There were a few people in the district headquarters who have subscribed to this service and they paid a fee of TSh. 10,000 per month (8.3 US Dollars).

The cable operator system was used for local advertising and notices. The system was used by local NGOs, religious organisations, political leaders and individuals, to pass various kinds of information to the community. The service was accessed by few people. However, the few who received this service were encouraged to pass the advert or notices to others. At the end of these local adverts and notices viewers were told "*analiyesikia tangazo hili amwambie na mwenzake*" meaning "if you heard this announcement pass it on to others". In this way the news was easily passed to people of the community.

Broadcasting from Tanzania radio rarely reaches Karagwe. In most cases the terrestrial signal for these radios is very weak in Karagwe. Only a few radio stations, such as Radio Tanzania Dar es Salaam (RTD), can be tuned into at specific times of the day. People who understand the language rely for news and other radio services on neighbouring countries such as Uganda and Burundi.

At the time of this research, two local radio stations (community radio) were in the final stages of launching their broadcasting services. The two radio stations were FADECO

community radio and Karagwe Media Association (KAMEA) community radio. KAMEA is a local NGO in Karagwe.

The FADECO radio had already acquired the broadcasting licence (Frequency100.8 FM) and the necessary equipment had been secured. The transmitter for FADECO radio was provided by UNESCO. Negotiations were underway with mobile telephone providers, such as TIGO Celtel, to use their masts for the radio antennas. According to the manager of FADECO telecentre (Mr. Joseph Sekiku), the radio will be used as a mouth-piece for reaching out to the communities. The radio will be used to broadcast marketing information that FADECO received daily from FOODNET-Market Information Service (MIS), Uganda, and Kenya Agricultural Commodity Exchange Limited (KACE), Kenya.

FADECO is an access point for the Open Knowledge Network (OKN). Through the OKN project, content relevant to poor communities is created and shared locally among communities in southern Africa. FADECO will use its community radio to broadcast content from OKN.

The KAMEA community radio's main objective is to reach women and children. The prime beneficiary of the radio and the primary audience will be women and children because they are the most vulnerable groups. However, according to the manager the programming of the radio will not completely exclude men. The interest of the sponsor drove the radio towards a gender-balanced approach. The manager of KAMEA radio is a woman and the board chairperson is also a woman. KAMEA radio is sponsored by the Danish government. They have a three-year contract, which is renewable. KAMEA radio station is planning to have an internet connection from FADECO. At the time of the present research, KAMEA community radio had all the equipment necessary to start broadcasting and they were waiting for the approval of their licence. According to the manager of KAMEA community radio, the organisation saw the communication vacuum in Karagwe and decided to start the radio station to fill the gap. Both of these stations will be broadcasting from Karagwe and the target community is the whole district of Karagwe.

5.2.3.5 Internet services and other services offered by FADECO telecentre

In terms of internet services, at the time of this research, the district had four other internet cafés, besides the FADECO telecentre. However, the other three internet cafés were not operational at the time of this research. This was due to reasons such as difficulties in accessing technicians whenever they encountered technical problems.

The history of the FADECO telecentre can be traced back to its resource centre which started as a private book collection of the founder of FADECO, Mr. Joseph Sekiku. Mr. Sekiku is an agricultural trained graduate with specialisation in post-harvest techniques, including food processing and preservation. With assistance from friends of FADECO in the UK, FADECO resource centre grew from a home library, with a few books to a well-equipped community library with four computers and some CD-ROM databases. In 2000 FADECO had the first dial-up internet connection in Karagwe and was operating what could be called an "internet post office". People of Karagwe were using the FADECO email address (fadeco@africaonline.com) to send out and receive emails. The received emails were printed out and sent to the relevant recipients, at a fee. The printed emails were distributed to owners by hand, since it is a small community where everyone is known. The internet post office operated for four year, until the time that email services were available in other places in Karagwe.

FADECO resource centre was formally upgraded to the status of a telecentre in November 2004, after receiving more reliable internet connectivity with assistance from Regional Agricultural Information Network (RAIN). The VSAT provided reliable internet connectivity for FADECO. At the time of this research, the internet connectivity in FADECO was the most reliable in the district. FADECO is managed by an Executive Board, which is composed of a Chairperson, Vice-Chairperson, Secretary, Treasurer and two committee members. The different projects are managed by a project manager, employed by FADECO. The chairman is the overall head of the organisation. Opening and closing times and days of FADECO telecentres are generally not fixed. People walk in and out at almost any time.

At present, FADECO provides the following ICT-related services to the community:

- Designing and maintenance of the Karagwe district website, www.Karagweonline.com;
- Public internet access;
- Computer training to interested groups and individuals;
- IT solutions and trouble-shooting;
- FADECO is an access point for the OKN; and
- Operating as an ISP.

Thus far, FADECO has been able to provide internet connection to three institutions. These are the Karagwe Secondary School, which is located 50 kilometres away, an NGO called Mavuno, which is located 80 kilometres away, and the Tanzania Electricity Supply Company (TANESCO) office at Kayanga. FADECO is providing a wireless internet solution for residents of Karagwe, with computers capable of accessing wireless internet. These services are provided gratis and require no password whatsoever within the FADECO premises "internet free zone' (see Figure 5.2.1). However, for users outside the FADECO premises the service is free, but they need to get a password and user name from FADECO in order to access the service.

Figure 5.2.1: Wireless internet at FADECO

Figure 5.2.1 shows internet users using wireless internet at FADECO telecentre. The picture was taken by the researcher at FADECO telecentre in Karagwe on 12 April 2007.

FADECO is involved in a number of agriculture-related activities. These are:

- Post-harvest food preservation techniques, by promoting simple preservation technologies such as fruit drying (farmer training, small cottage industries-jams, etc; construction of fruit dryers);
- Linkage of farmers to markets through increasing access to information concerning the markets. This includes market prices from FOODNET-MIS -Uganda and KACE – Kenya); and
- Question and Answer Service [QAS] for farmers, in collaboration with the Ministry of Agriculture in Tanzania, Sokoine University of Agriculture (SUA) in Tanzania and the Technical Centre for Agricultural and rural Co-operation of the European Union.

5.2.4 Ngara district

This section presents an analysis of the current status of the ICT sector development in the Ngara district. The information provided in this section came from observation, documents collected from the Ngara telecentre, Ngara district office, interviews with managers of telecentres, an interview with a senior member of staff from radio Kwizera and informal talks with other key personnel in the district.

5.2.4.1 Access to electricity supply and condition of the roads

Roads are the major means of transport inside and outside Ngara district. The district was served by a relatively good network of main roads joining Tanzania with Rwanda and Burundi. However, some district roads and feeder roads were not in a good condition and some were not passable during most parts of the year. Air travel was another means of transport to and from Ngara**.** Ngara district was served by one small airstrip based at Ruganzo. This airstrip is mostly used by refugee relief agencies' staff to travel between Ngara and another refugee camp at Kasulu, in the Kigoma region.

Before 2004, the entire district of Ngara did not have any form of electricity supply. Small generators were used to meet household needs by the few people who could afford them. In 2004, Ngara was connected to thermal power by TANESCO. The diesel engine generators for thermal power are currently supplying electricity only at the district headquarters. Besides

being expensive to maintain, the production capacity of this kind of power is not sufficient to meet the demand. Therefore a more sustainable power source is required.

5.2.4.2 Fixed telephone services

Fixed telephone services are provided by TTCL in Ngara. This is a telephone company which deals with the provision of landline telecommunication services. Services of TTCL are widespread all over Tanzania. TTCL has a branch office in the Ngara district. For several years, the Ngara district has had problems of poor communication. Before 2003, the only means of telecommunication was that of fixed telephone lines provided by TTCL, telecommunications operator in Tanzania. TTCL enjoyed a monopoly in the industry and arguably did not put in enough effort to efficiently meet communication needs in Ngara.

5.2.4.3 Mobile telephone services

Although the rest of the country started using mobile phones in 1993 when the first mobile phone operators (Mobitel- now operating as Tigo), was licenced in Tanzania, the people of Ngara started using mobile phones 10 years later, in 2003 (Ngara District Council 2006). Mobile phone services were first introduced in Ngara by Celtel. In 2004 and 2005 Vodacom and Mobitel/Tigo launched their services in the Ngara District. At the time of this research, almost all parts of the district could be reached via mobile telecommunication. Vodacom and Tigo were available at the district headquarters while the rest of the district was covered by Celtel. This situation has created an opportunity for the growth of business and reduced travels cost for social and business reasons.

There were several public phone services available in Ngara, such as the Vodacom public phone service, commonly called "*simu ya watu*", rendered as people's phone which is "housed in a metal container". Small-scale entrepreneurs have public phone services, where some sell air-time and offer mobile phone-charging services.

5.2.4.4 Radio and television

None of the Tanzanian terrestrial television or radio signals reached Ngara district at the time of this research. Only terrestrial radio and television stations signals from the neighbouring

countries of Rwanda and Burundi reached Ngara. However, due to the different languages of broadcasting, the people of Ngara could not rely on these foreign channels for news, information and entertainment. Tanzanian radio and television station were only accessible in Ngara via a satellite. Very few people in Ngara had the resources to buy satellite dishes. Therefore the majority of people had no access to these radio and television channels.

Ngara district had one community radio, known as "Kwizera", that broadcast right from the district. Radio "Kwizera" was started by an international Catholic Church service to refugees called The Jesuit Refugee Service (JRS). "Kwizera", meaning "hope" in Rwandese was set up as a reaction against the Mille Collines radio in Rwanda, which was later termed "hate radio", because it was used to broadcast propaganda of hatred and division between the Tutsis and the Hutus in a context of war. Mille Collines radio was accused of playing a significant role during the April-July 1994 genocide in Rwanda (BBC 1999).

Radio Kwizera's audience included listeners from neighbouring Rwanda, as well as the Ngara community. The radio broadcast news, current affairs and community messages, which serve an important social function as well as helping people to trace relatives who went missing during the war. Religious broadcasts help to promote inter-religious dialogue, which helps people to work together for community development. The radio had programmes for primary school children, health education programmes, including information on maternal and child health, and tips on agriculture and livestock management.

The languages of programming were Kirundi (for the refugees) and Swahili (for Tanzanians). The station re-broadcast programmes in English and French from Germany, France and United Nations Radio. Most of the programming was produced locally.

5.2.4.5 Internet service and other services provided by the telecentre

The Ngara Multipurpose Community Telecentre was the only centre in Ngara that provided internet access to the public. Ngara telecentre has three sites:

- The first telecentre is located at the headquarters of Ngara district. This is the place that hosts the local administration, as well as the UNHCR and UNICEF offices. Services at this site are offered at a fee.
- The second telecentre is located at a place called K-9, which is about 17 kilometres from Ngara district headquarters. This is a place where seven relief organisations and a secondary school for girls are situated. Services at the site are offered free of charge. At the time of this research (April-May 2007) this centre was not operating due to internet connectivity problems. Their VSAT had broken down and the centre had been closed for a period of about six month.
- The third telecentre is located a further eight kilometres from K-9, where the Lukole refugee campus is located. Services at this site are offered at a fee. As at the K-9 site during the time of this research (April-May 2007) this centre did not have internet connection and the researcher was told that it had been like that for seven months. The few remaining refugees use the telecentre to learn how to use computers.

At the first two sites the telecentre is operated using electricity from thermal power generator serving the Ngara district. At the third site, Lukole, the telecentre is operated by electricity from a generator located in the camp. All three sites have an internet connection through a VSAT. A separate VSAT facility is provided at each site.

This study was based at the Ngara site. Services offered by the Ngara site telecentre were telecommunications, email, desktop publishing, secretarial and administrative services, training, information and news, Computer training, Scanning, CD-ROM burning, IT Consultancy, internet café and e-education. The telecentre opens from 08:00 am to 16:00 pm Monday to Saturday. On Sundays it is closed.

5.3 Policies available to facilitate development and utilisation of ICTs in the selected rural areas of Tanzania

This research question sought to identify policies which facilitated the development and utilisation of ICTs in the selected rural areas of Tanzania. In answering this research question, national ICT related policies were identified and assessed in order to determine the effects that they have on the ICTs sector developed in the researched rural areas. Three individuals

from different organisations/government agencies were interviewed. These organisations were the then Ministry of Infrastructure Development (MoID), the Tanzania Communication Regulatory Agency (TCRA) and the Tanzania Commission for Science and Technology (COSTECH).

5.3.1 The then Ministry of Infrastructure Development (MoID)

The MoID was responsible for ICTs development in Tanzania. An interview was conducted with an IT officer in the national ICT co-ordination office in the MoID, which is responsible for initiating, formulating and reviewing policies related to ICTs. It is also responsible for initiating and co-ordinating the implementation of the information society development programmes in the country. MoID, in collaboration with the TCRA, initiated a number of ICT projects and telecentres which were later given to women groups in Mpwapwa, Kinampanda, Mtwara and Wete Pemba.

5.3.2 Tanzania Communication Regulatory Agency (TCRA)

The TCRA is a government agency under the MoID. Its role is licensing and regulating the ICT sector in the United Republic of Tanzania. An interview was conducted with a senior telecommunications engineer in the ICT department of TCRA. The mandate of this department is to promote universal access to ICT services throughout Tanzania and to promote ICT awareness in the country. The department is responsible for conducting research and studies on ICT development, to improve the quality of service in the country.

5.3.3 Tanzania Commission for Science and Technology (COSTECH)

The Tanzania Commission for Science and Technology **(**COSTECH) is a parastatal organisation which has the responsibility of co-ordinating and promoting research and technology development in the country. It is the chief advisor to the government on all matters pertaining to science and technology and their application to the socio-economic development of the country. The functions of COSTECH include the evaluation of existing policies and advising the government on its science and technology policy. COSTECH participated in the formulation of the current National ICT policy. It is also running a number

of ICT projects and telecentres. An interview was conducted with the director of the information and documentation department at COSTECH.

5.3.4 Co-operation between MoID, TCRA and COSTECH for the development of ICTs in rural areas

The MoID has a role in developing policy and approving regulations related to ICTs. The TCRA have a role in regulating the ICTs industry and creating a level playing field so that the various ICT operators can compete fairly. COSTECH is a research organisation responsible for carrying out research on various aspects of science and technology.

These three organisations work together to ensure wider accessibility of ICTs by the population. Due to its small number of employees, the MoID does not have a strong influence on ICT and telecommunications policy or regulation. As an interviewee from TCRA put it, "the regulator is trying to compensate for lack of policy from the ministry's side by sometimes doing activities which originally fall under the jurisdiction of the MoID". An interviewee from the MoID said that implementing ICT projects is not the prime responsibility of COSTECH. Nevertheless, the MoID was for a long period, not doing enough. Seizing the opportunity, COSTECH took over and started various ICT projects in the country.

The respondent from COSTECH said that the problem that they had in this partnership was that the MoID did not carry out its policy making function effectively. Instead, the MoID is involved in implementation functions such managing and supervising telecentres. Lack of leadership, and ineffective policy-making and strategies to benefit the poor, is negatively affecting the development of the ICT sector in rural areas of Tanzania said the respondent from COSTECH. The respondent said that most of the achievements that TCRA could be proud of were only happening in urban areas. For instance, there were more than twenty Internet Service Providers (ISP) in the country. However half of these are in Dar es Salaam and the rest are in major cities and towns. Nevertheless, the MoID considered TCRA and COSTECH as partners in ICT sector development in the country.

5.3.4 Policies to ensure wider accessibility of ICTs to the majority in Tanzania

This research question involved respondents from the national ICT co-ordination office, as well as respondents from the TCRA. In this case, respondents were asked to indicate policies/strategies that their organisations have put in place to ensure wider accessibility of ICTs to the majority in Tanzania, especially those living in rural areas. An infrastructure development and universal access fund was mentioned by the respondents from the nation co-ordination office as the two major strategies which are in place to ensure wider accessibility of ICTs. TCRA mentioned the universal access fund. These strategies are explained in detail in sections 5.3.6 and 5.3.7.

5.3.5 National ICT policy and its implementation strategy

As explained in section 2.3.2 of Chapter Two, Tanzania adopted its national ICT policy in 2003. The policy outlines nine broad priority areas that needed to be addressed to achieve the overall mission of the policy. An interview with an IT officer from the national ICT co-ordination office indicated two areas among the nine key areas of the policy that the ministry was working on at the time of this research. These two areas have major implications for the ICT sector development in rural areas. These are the universal access and infrastructure development.

These two areas are part of the implementation strategy of Tanzania's national ICT policy. The then MoID in Tanzania has produced a national ICT policy implementation strategy. During the time of the present research (June 2007), the ICT policy implementation strategy document was being circulated to relevant stakeholders for them to prepare their plans of action. During this time, the strategy document was still in the draft form, but all the ministries in Tanzania were aware of it and were using it for planning purposes. According to the interviewee, the ministry (MoID) was expecting to endorse the national ICT implementation strategy by the end of 2007. Different sectors were already using it to plan their activities.

5.3.6 Infrastructure development

In collaboration with the Chinese government, the Tanzanian government was at the time of this research working on a project aimed at developing a national ICT infrastructure backbone. This national fibre-optic backbone was expected to be connected with the EASSy cable at the Dar es Salaam harbour (refer to section 2.3.2.2 of Chapter Two and section 3.6.4 of Chapter Three). The construction of both cables was expected to be complete in 2009. According to the interviewee, the national backbone was going to terminate at all the 26 districts headquarters. According to the interviewee, from the national ICT co-ordination office, ICT infrastructure development in other parts of the country which consists of villages located far from the district headquarters were to be left to the private sector. However, one wonders about the logic behind leaving the most vulnerable population to the private sector.

The objective of the national ICT infrastructure backbone project is to make ICTs infrastructure available to all people in the country. The aim is to reach all the remote areas and disadvantaged communities, in both rural areas and the under-served urban areas, said an interviewee from the MoID. Data collected in headquarters of the four districts included in this research reveals that bringing the ICT infrastructure up to the district headquarters is not enough to reach the rural areas. Therefore, notwithstanding the significant contribution that the national ICT backbone would make in increasing rural access to ICTs, people living in areas located far from the district headquarters, who are by far the majority, would still not be reached. The biggest challenge for the government will be to expand the ICT infrastructure further into the rural areas beyond the district headquarters.

5.3.7 Universal access fund

The Tanzanian Universal Communications Service Access Fund was expected to be operational by December 2007. At the time of this research, TCRA, in collaboration with the then MoID, were charting out guidelines on how the fund was going to be implemented. They were also working on the modalities and the formulae that would enable telecommunication operators to contribute to the fund.

Even before the universal access fund was considered, there had been various efforts aimed at increasing ICT accessibility in rural areas. Most of these had been in the form of telecentres. When the universal access fund becomes operational, most of these efforts are expected to be boosted and new ones initiated.

5.3.8 Comments on the delayed implementation of the universal access policy

In 1993, Tanzania was the first country in East Africa to implement telecommunication sector reforms. The final structure of the sector, especially regarding rural service provision, only came about in 2007, with the enactment of the Universal Access Act. This process took 14 years. Respondents from national ICT co-ordination offices, as well as from TCRA were asked to indicate what their comments on this issue were and what the cause for the delay was. Responses for this question were analysed qualitatively and several themes emerged from the data.

5.3.8.1 Political changes

An interviewee from the national ICT co-ordination offices said changes in the political regime was one of the reasons for the delay. “Every new government that comes into power comes with different priorities and visions,” he explained. In his experience, “It takes time to educate the people in power about the importance of ICTs and to get their support for the ongoing ICT initiatives”. There have been three different presidents between 1993 and the present. Relevant ministries have experienced top leadership change during every new political regime. Not only have the personalities in the positions changed, but also the ICT sector as a whole has seen various shifts from one ministry to another. “In 1993,” explained the interviewee, “it was under the Ministry Communication and Transportation, then it changed to the Ministry of Infrastructure Development”. Soon after the completion of the interviews for this research the ministry changed again to the Ministry of Communications, Science and Technology. This undue political interference was partly to blame for the inconsistency of the implementation of plans.

5.3.8.2 Changes within the regulatory authority

The interviewee said there had been many of changes in the organisation and structure of the regulatory authorities themselves. At the beginning of the ICT sector reforms in 1993, two regulatory authorities were formed. These were the Tanzania Communications Commission (TCC), which was regulating telecommunication services, and the Tanzania Broadcasting Commission (TBC), which was regulating the broadcasting industry. In 2003, the two regulatory bodies were merged to form the Tanzania Communication Regulatory Authority (TCRA). Much time was spent in restructuring the regulatory agencies and this caused delays in the implementation of some policies, including the universal access policy.

5.3.8.3 Privatisation of incumbent telecommunication company in Tanzania TTCL

Another main cause of the delayed implementation of the universal access policies, cited by the interviewees, was the privatisation of the incumbent telecommunication company in Tanzania TTCL. The Privatised TTCL, with an exclusivity of four years, that is from 2001 to 2005, was required to install two payphones for every centre/village with 3,000 inhabitants or more. The company was supposed to raise the number of fixed-lines from 180,000 to 450,000 in two years and finish the remaining lines to reach 800,000 in the last two years of its exclusivity. However, within the four years of its exclusivity period, which ended in February 2005, the company failed to meet its obligations. Moreover, the Tanzanian government lost Tsh. 55 billion (US$49.86 million) in the privatisation deal, which was followed by a number of court cases between the MoID and TCRA on one side the new TTCL investor on the other side. This was also reported by (CINSA 2005; Edwin 2003; Edwin 2004).

5.3.8.4 Ideological changes

The interviewee cited national ideological shifts as a key cause in the delayed implementation of rural ICT access policies. Tanzania has been a socialist country for a long time. However, in recent years, although not publicly declared, the country has started embracing capitalist ideologies. The whole change of the philosophy of the country from socialism to capitalism, with privatisation and liberalisation policies, is still confusing to many. It takes a long time to change mindsets and ideologies especially at the policy making level. This caused delays in the implementation of policy objective in the ICT sector, said the interviewee.

5.3.8.5 Fast technological change

Another respondent said that another cause of the delay is the fact that changes in technology happen very fast and sometimes it is not easy to catch up with the speed of the fast-changing technologies. Other causes cited by the respondent were irregularities concerning the management of the universal access fund. There was a long stalemate caused by differences of opinion regarding regulation of the universal access fund. According to the interviewee, it took a long period for a decision to be made on who was responsible for the operation of the universal access fund between MoID and TCRA. Finally, it was decided that the fund should be operated by an independent entity. Another problem cited is the long procedures involved in formulating the Act and getting it approved. The bureaucracy involved consumed much time and energy.

5.3.9 Comments on the ICTs for socio-economic development in the Tanzanian context

In another question, respondents from all three organisations were asked to comment on the whole debate of ICTs for socio-economic development, especially in the Tanzanian context.

The interviewee from MoID said they saw ICTs as a technology, which has the capability of liberating the people. ICTs, in their view, are a necessary tool, able to unite, connect and network the whole country. This is especially important given the enormous size of the country and the huge economic, social and technological gaps between the urban and rural areas. The interviewees observed that, due to the potential role of ICTs in socio-economic development of the country, the ministry was organising various events to raise awareness of ICTs among the people. One of these events was the national ICT Week, which took place from 14 May 2007 to 21 May 2007. As part of these celebrations, fifteen ICTs operators took part in ICT exhibitions at the Diamond Jubilee hall in Dar es Salaam. The theme of this event was “connecting the young, opportunities for ICT”. According to the interviewees, the ICT week was going to be celebrated every other year.

The interviewees pointed out that ICTs were a means of connecting different aspects and different people in the country together, so as to stimulate development. ICTs such as the internet will provide different opportunities to the people of Tanzania, by educating them on

how other people in different countries were doing. Through the internet, people will be able to learn, devise new business ideas and expand the market for the businesses or agricultural products.

An interviewee, who was a senior telecom engineer from TCRA, was confident that ICTs could make a big difference in people's lives. She demonstrated strong confidence in the ability of ICTs to contribute positively in the education sector. "It [ICTs] will make Tanzanians more knowledgeable and hence be able to assimilate the world economy," she stated. In her experience, students become more enthusiastic with their studies when they are given the opportunity of learning to use the computer. She said that ICT is like a new fashion that everybody wants to be part of.

The respondent said that a community telecentre will help young people learn from other young people in different parts of the world. Access to ICTs will help farmers get better prices for their agricultural products. With ICTs, rural areas will not be the same. A young person in Sengerema, which is a rural area, can use ICTs and benefit a lot more than a person living in Dar es Salaam (an urban setting) who has not been able to use ICTs. Therefore, in the future, people will not be able to distinguish rural from urban, in her estimation. This is the reason why the Tanzania universal access fund will cover rural areas as well as urban, under-served areas.

The respondent from TCRA said that ICTs are like a road. "When a road is constructed to connect a rural community with the rest of the world, immediate development will be seen," she said. However, people need to be educated and trained on how to use ICTs for them to get maximum benefit from the ICTs.

The respondent from COSTECH said that ICTs have a major role to play in the development of the human capital and in the enrichment of the mind through the knowledge and information provided by them. He said that this aspect of development will help people engage their minds in solving their day-to-day problems and in the fight against poverty.

5.3.10 Barriers to effective utilisation of ICTs for poverty reduction in the Tanzania context

In another question, respondents were asked to indicate barriers that they think limit effective utilisation of ICTs for socio-economic development in the Tanzanian context. Different barriers were mentioned by respondents from all three organisations.

5.3.10.1 Financial/economic barriers

Implementing nation-wide ICT projects need capital which, in most cases, the government does not have. For instance, at the time of this research, the MoID had telecentres which had been started three years earlier. However, the MoID did not have enough money to expand them and increase the range of services that these telecentres were offering. They also needed money to train telecentre staff on ICTs and management skills for the telecentres.

5.3.10.2 Infrastructural barriers

It is evident from the interviewees that infrastructure poses one of the main barriers for effective implementation of ICTs in Tanzania. The ICT infrastructures, such as the telecommunication network, roads and electricity supply, were inadequate. In the case of the rural telecentre one would need appropriate buildings which, in most cases, do not exist.

5.3.10.3 Inadequately trained labour force

The inadequacy of labour and trained ICT personnel is a challenge to effective utilisation of ICTs for poverty reduction. According to the interviewees, it was in response to this that the government started the University of Dodoma, with a strong emphasis on a Faculty of Informatics. However, according to the interviewees, the demand is higher than the University of Dodoma has been able to supply. There is a lack of capacity building for those people who are already in service delivery.

5.3.10.4 Mindset issues

Most people, especially in the villages are used to receiving things from the government or donors. They do not understand that they are responsible for their own development and that they also need to do something for themselves. Therefore, because of such a mindset, even

management and sustainability of community telecentre projects becomes a problem. Ownership of the project by the community is always a challenge. However, this may be a problem of priorities as opposed to that of mindset. It is possible that a telecentre is not the top priority for the community.

5.3.10.5 Lack of capacity within the ministry

There has been inadequate capacity and shortage of staff in the then ministry of infrastructure development. This had a negative impact on policy formulation and the ICT leadership in the country. The politicians and parliament, in general, have been accused of not performing their required duties effectively, namely providing ICT leadership in the country. There is a shortcoming as far as ICT policy formulation and leadership from the ministry is concerned.

5.3.10.6 Language barriers

The official and business languages of Tanzania are Swahili and English. However, Swahili is the national language and the medium of instruction at primary schools. English is the medium of instruction at tertiary educational level. Therefore English is spoken only by highly educated people and most Tanzanians are more comfortable speaking Swahili as their first language. Tanzania contains over 120 different ethnic groups, with each speaking its own local language. However, all these groups speak the same national language, Swahili. Thus, in the Tanzanian context, local languages may be linked with the rural homestead or with traditional values; Swahili may be linked with town life or trade and English with government service, the professions and high-status jobs. In the Tanzanian context, most people cannot use the internet, simply because they do not understand the language the machine is using.

5.3.10.7 Too much commercialisation of the ICT sector activities

An interviewee from COSTECH indicated that the government and the public sector approaches to ICT development were inappropriate. According to the interviewee, this was because instead of developing internal capacities within the organisations for activities such as designing and maintaining websites, creating databases and online advertising, these activities are normally tendered out to private sector enterprises. This makes the whole idea of ICT adoption complicated and expensive. In addition, this approach to ICT adoption has a

negative effect on ownership of ICT projects by the organisations. Private enterprise undermines the development of such initiatives within government institutions.

5.3.10.8 Regulatory interventions

Interviewees lamented that the regulation of the ICT sector in Tanzania had negatively affected the widespread assimilation and adoption of ICTs. The interviewee from COSTECH indicated that, when regulation is treated as another means of making money for the government, rather than facilitating the spread of the technology, it affects the sector negatively. High licence charges for telephone operators and other taxes are then transferred to customers, thereby making the services prohibitively expensive for the majority.

5.3.10.9 Other barriers

Other barriers mentioned were lack of local content, poverty and affordability issues and lack of knowledge on how to use ICTs.

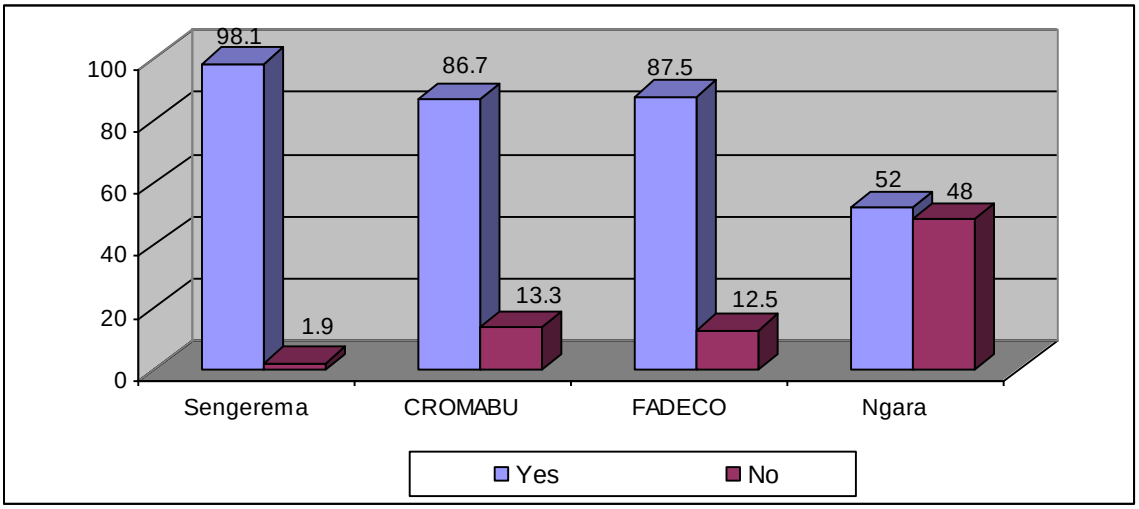
5.4 Access to ICTs by people in the selected rural areas of Tanzania

The third objective of the study was the extent to which people in the selected rural areas of Tanzania had access to ICTs. In order to answer this research question a number of factors that influence access to ICTs were considered. The definition of access was expanded to include access that goes beyond physical access to the technologies, as advocated by Bridges.org (2003), Lewis (2004) and Clement and Shade (2000) (see section 3.13 in Chapter Three). Data for this research question was obtained using Appendix 4.1 (Section 4).

5.4.1 Awareness of the telecentre and use of telecentre services

Awareness of the telecentre and the services offered by the telecentre is an important step in ensuring that the services are used effectively and make a difference to people's lives. In question 4.1.1, respondents were asked whether or not they had heard of the telecentre before the current study. Figure 5.4.1 presents the results from the respondents. Awareness was the highest in Sengerema where, 52 (98.1%) of the respondents were aware of the telecentre and the lowest in Ngara, where 24 (48%) of the respondents were not aware of the telecentre and the services offered.

Figure 5.4.1: Awareness of the telecentre

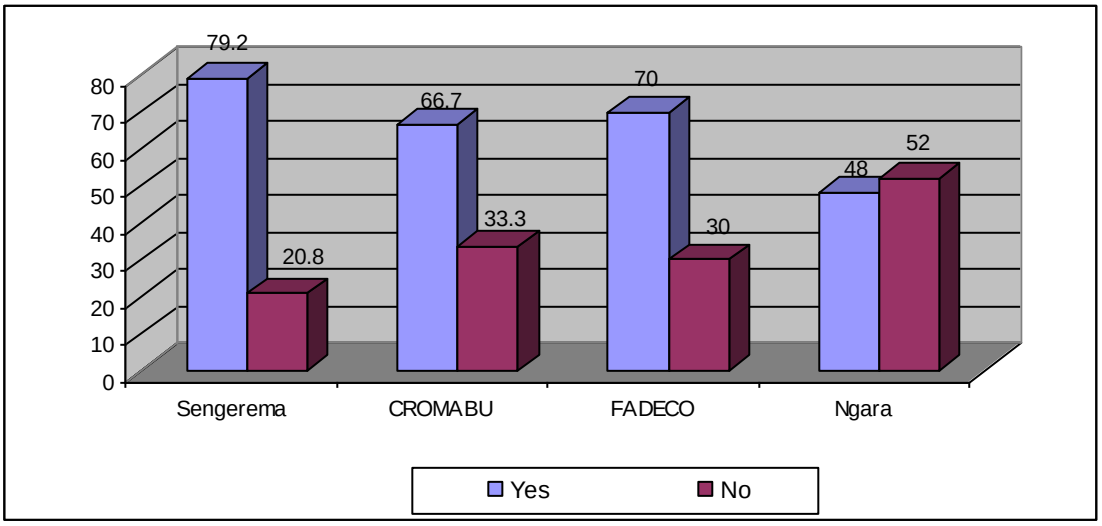


N=Sengerema 53, CROMABU 60, FADECO 40, Ngara 50

In question 4.1.2, respondents were asked how they became aware of the telecentre. This was an open-ended question, to which different kinds of answers were given. Some said they received the information by word of mouth from other people. This was 5 (11%), 20 (39%), 21 (60%) and 20 (77%) in Sengerema, Magu, Karagwe and Ngara, respectively. Few respondents received the information through brochures and adverts. This was 1 (2%), 9 (17%), 4 (11%) and 6 (23%) for Sengerema, Magu, Karagwe and Ngara, respectively. Telecentre awareness campaigns were much more popular in Sengerema and Magu, where 12 (22%) and 23 (43%), respectively, mentioned them as their source of awareness of the telecentre. In the case of Sengerema the majority of people 34 (65%) heard the information from the Sengerema community radio.

In question 4.1.3, respondents were asked if they had ever visited the telecentre. The results to this question are shown in Figure 5.4.2. In Sengerema 42 (79.2%) of the respondents said that they had visited the telecentre. In Karagwe 28 (70%) of the respondents said that they had visited the telecentre, while 40 (66.7%) and 24 (48%) said they had visited the telecentre in Magu and Ngara, respectively.

Figure 5.4.2: Visit the telecentre

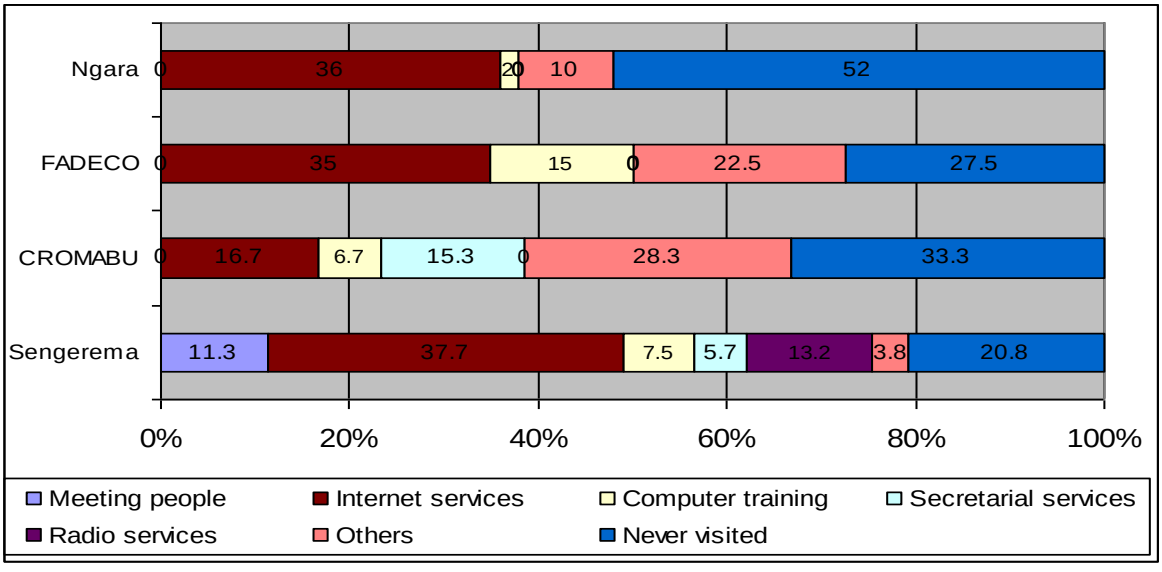


N=Sengerema 53, CROMABU 60, FADECO 40, Ngara 50

5.4.2 Reasons for visiting the telecentre

In question 4.1.4, respondents were asked what their main reasons for visiting the telecentre were. This was a closed-ended question, where respondents were requested to choose from the list provided. The respondents were given an option to mention some other reasons which were not listed. The results of this question are presented in Figure 5.4.3.

Figure 5.4.3: Reasons for visiting the telecentre



N=Sengerema 53, CROMABU 60, FADECO 40, Ngara 50

Accessing the internet was mentioned as an important reason why people visited the telecentres. This was especially the case in Sengerema, where 16 (37.7%) of the respondents said that they visited the telecentre to access internet services. In FADECO and Ngara 10 (35%) and 7 (36%) of the respondents, respectively, indicated that they visited the telecentre to access internet services. Computer training was mentioned as the reason for visiting the telecentre by 4 (15%) people at FADECO, while secretarial services were mentioned as the main reason for visiting the telecentre by 6 (15.3%) people at CROMABU.

Respondents also visited the telecentre for a number of other reasons, which varied from one telecentre to another. These were presented in a category termed 'other reasons'. In Sengerema, the 'other' category involved those who came to the telecentre with various queries and information needs such as:

- Finding out examination results for their children from the Ministry of Education website. This was common in all the telecentres.

In Magu (CROMABU telecentre) the 'others' category involved those who came to the telecentre with information needs such as:

- Prices of their agricultural products in various markets in and outside Magu district.

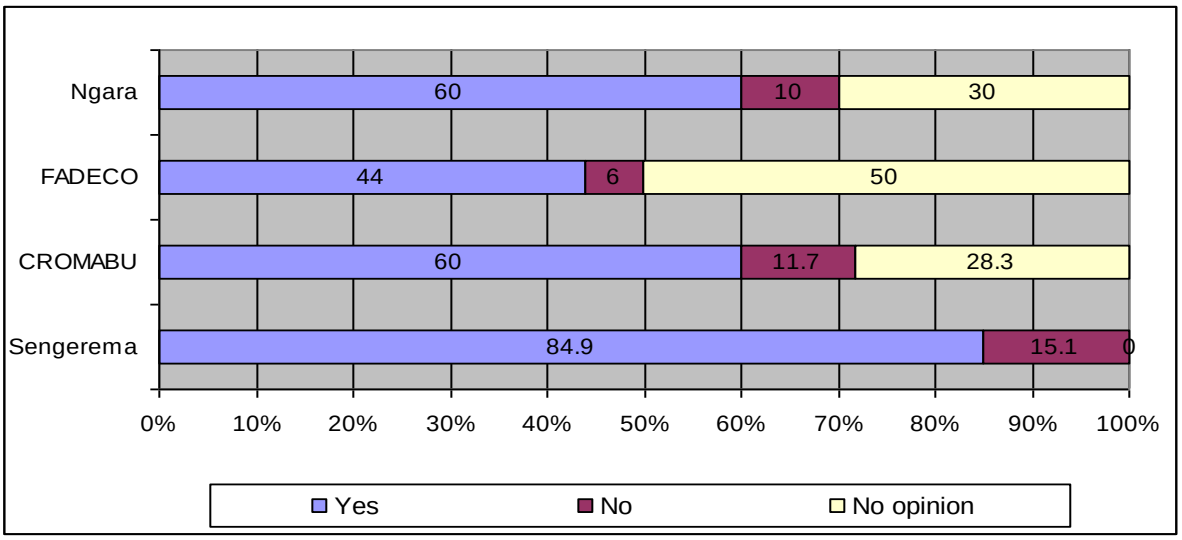
In FADECO the 'others' category involved those who came to the telecentre with information needs such as:

- Finding markets for their agricultural products
- Enquiring about the various agriculture-related techniques such the preservation of fruit and vegetables.

In question 4.1.6, respondents who said that they used telecentre services were asked to indicate whether they were satisfied with the services or not. The results from this question are shown in Figure 5.4.4. The majority of the respondents using the telecentres said that they were satisfied with the services. This was 45 (84.9%) in Sengerema, 36 (60%) in CROMABU, 18 (44%) in FADECO and 30 (60%) in Ngara. The 'no opinion' response came mainly from people who had never used telecentre services.

Some respondents said a telecentre service such as public access to the internet was only available at the telecentre in their locality. Therefore, on the basis of that, they had nothing else to compare the telecentres services with and therefore they were satisfied.

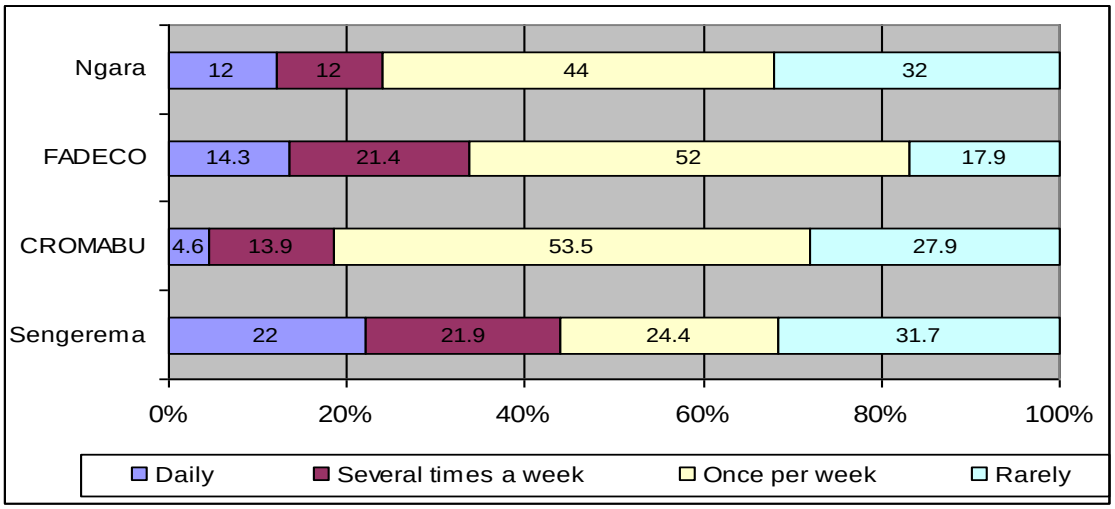
Figure 5.4.4: Satisfaction with the services provided by the telecentre



N=Sengerema 53, CROMABU 60, FADECO 40, Ngara 50

In question 4.1.7, respondents who said that they used telecentre services were asked to indicate how frequently they used the telecentre in a week. The results of this question are shown in Figure 5.4.5. The results indicate that the majority of respondents, 20 (53.5%) in Magu, 18 (52%) in Karagwe and 11 (44%) in Ngara, said that they used the telecentre services once a week. However, in the case of Sengerema, community radio-related services were, in most cases, used daily. Therefore it had more people who used the telecentre services daily, compared to the other telecentres.

Figure 5.4.5: Frequency of using the telecentre in a week



N=Sengerema 53, CROMABU 37, FADECO 34, Ngara 25

In question 4.1.8, the respondents who were not using the telecentres were asked to explain the reasons why they were not using the telecentres. The answers from the respondents included:

- Business was too small to involve the use of computers and internet;
- Not knowing how or whether computers and internet can help them;
- What they do has nothing to do with computers;
- Perception that the telecentre is a place for the learned and those who can speak English;
- Not knowing how to use computers; and
- Cost of services too high, cannot afford them.

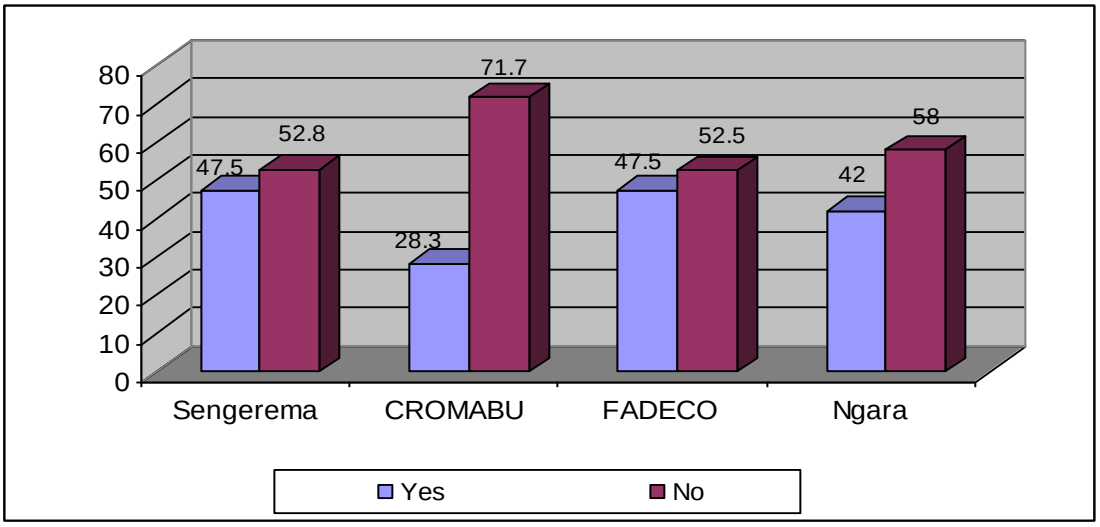
5.4.3 Ability (skills) to use computers

Ability to use ICTs is one of the criteria that determine access to them. Bridges.org (2003) pointed out that capacity and ability to use the technology will, in turn, determine the use of these technologies and their impact on peoples' lives. In question 4.2.1, respondents were asked whether or not they knew how to use computers. Results of this question are indicated in Figure 5.4.6. At Sengerema, 25 (47.5%) of the respondents said they knew how to use computers while 29 (52.8%) said they did not. At CROMABU, 17 (28.3%) knew how to use computers, while 43 (71.7%) said that they did not. At FADECO, 19 (47.5%) knew how to

use computers while 21 (52.5%) did not. At Ngara, 21 (42%) of the respondents knew how to use computers and 29 (58%) did not.

In questions 4.2.2 to 4.2.4, respondents were asked whether or not they knew how to use the internet (World Wide Web (WWW)), email and if they had an email address. At all the sites, the majority of the respondents who knew how to use computers said they knew how to use the internet (WWW) and email. The majority of them said that they had email addresses.

Figure 5.4.6: Ability to use computers

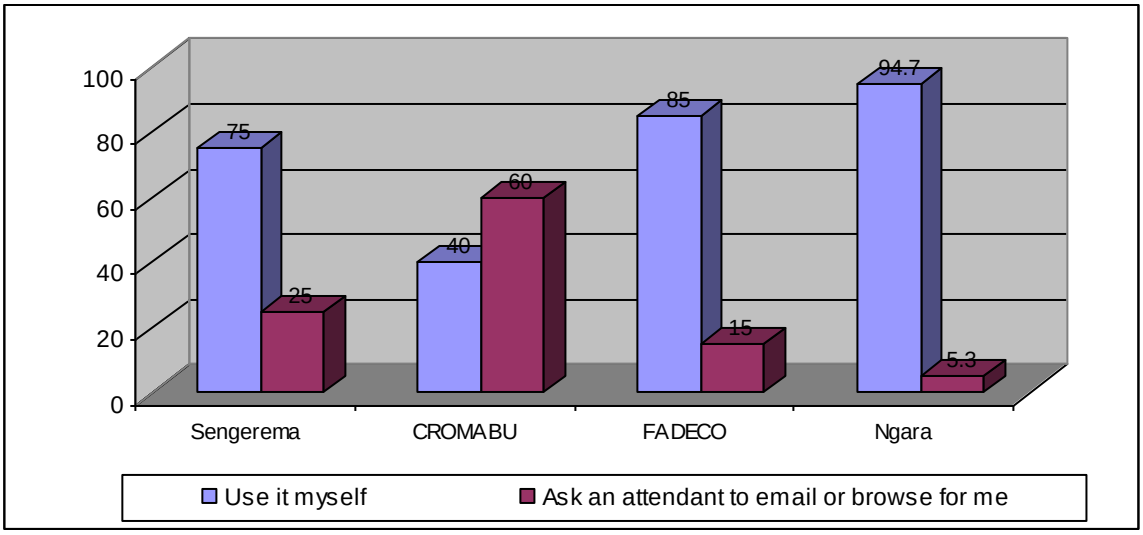


N=Sengerema 53, CROMABU 60, FADECO 40, Ngara 50

5.4.4 How do you use email?

In question 4.2.5, the respondents who said that they used email were asked how they communicated by email (see Appendix 4.1). The majority of the respondents indicated that they were able to use email themselves, without the assistance of the telecentre attendant. This is shown in Figure 5.4.7. The frequency was 19 (75%) at Sengerema, 16 (85%) at FADECO and 20 (94.7 %) at Ngara. At CROMABU it was 7 (40%).

Figure 5.4.7: How do you use email?

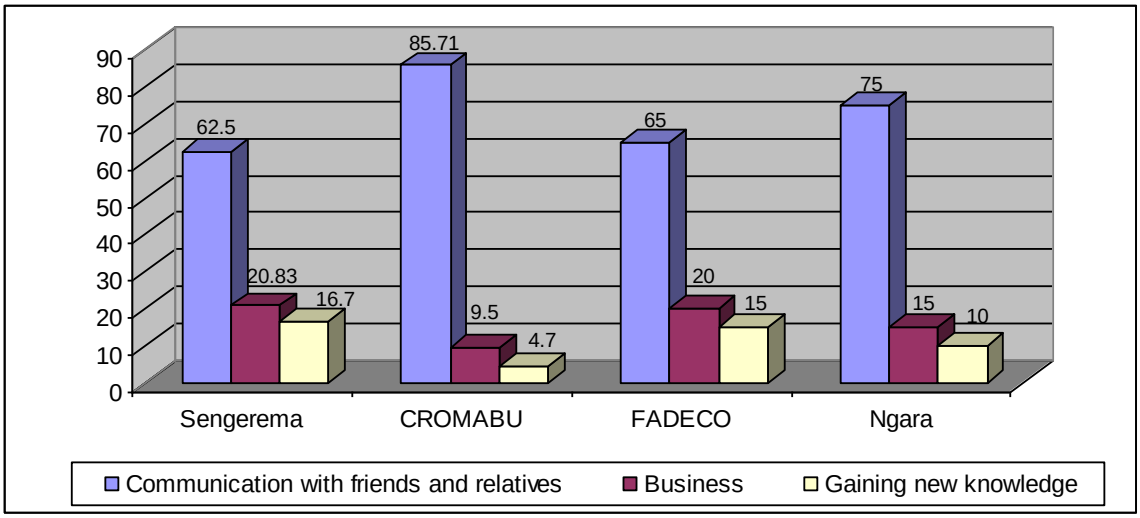


N=Sengerema 25, CROMABU 17, FADECO 19, Ngara 21

5.4.5 Reasons for email use

In question 4.2.6, respondents were asked what they usually use email for (see Figure 5.4.8). Social reasons and communication with friends and family members who live abroad and elsewhere in Tanzania was chosen as the main reason for using email. The frequency was 16 (62.5%) for Sengerema, 15 (85.71%) for CROMABU, 12 (65%) for FADECO and 16 (75%) for Ngara.

Figure 5.4.8: Reasons for email use

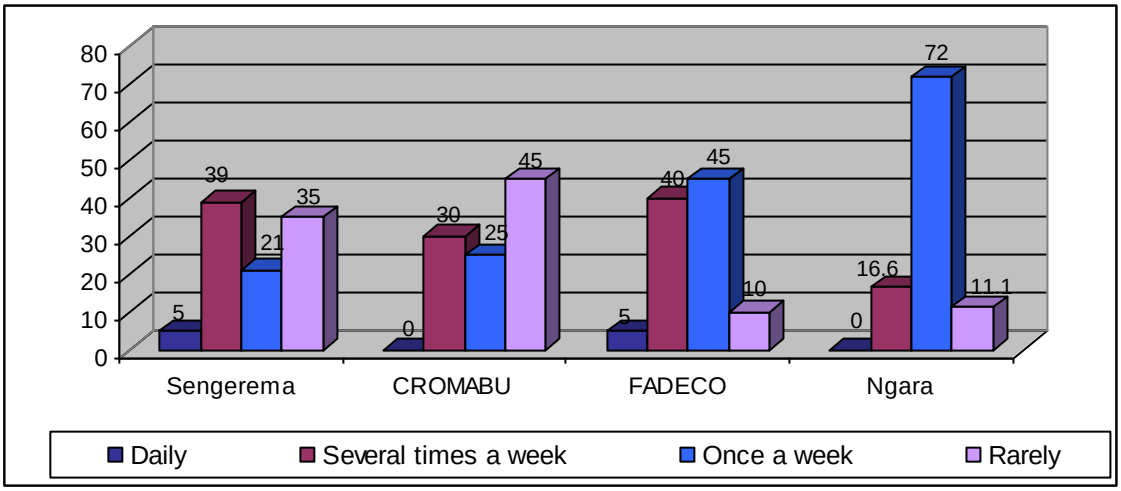


N=Sengerema 25, CROMABU 17, FADECO 19, Ngara 21

5.4.6 Frequency of using email in a month

In question 4.2.7, respondents were asked the number of times they used their emails in a month (see Figure 5.4.9). The majority of the respondents indicated that they used emails on a weekly basis. Very few people used email daily, in the Sengerema and FADECO telecentres. In CROMABU and Ngara none, of the respondents said they used their emails daily.

Figure 5.4.9: Frequency of using email in a month



N=Sengerema 25, CROMABU 17, FADECO 19, Ngara 21

5.4.7 Cost of services at the telecentre

Table 5.4.2 shows the cost of services in all the telecentres. Internet usage fee was Tsh. 1000 (83 US cents) per hour, in all the telecentres. Half an hour was 700 TSh. (58 US cents) for CROMABU and FADECO and 500 TSh. (42 US cents) for Sengerema and Ngara. The cost of computer training varies from 15,000 TSh. to 30,000 TSh. (25 US dollars). FADECO's fees for computer training were the highest among the four telecentres. Computer training is the chief source of income for the Sengerema telecentre. The telecentre receive students from all over Sengerema and neighbouring districts. Hostel facilities were provided for students coming from far away. The telecentre adopted the Tanzania Vocational Education Training Authority (VETA) syllabus in teaching computers. Students are given a certificate which is recognised by many employers.

Table 5.4.2: Cost of services in each telecentre

Item	Sengerema	CROMABU	FADECO	Ngara
Internet usage fees per hour	1000 TSh. (83 US cents)	1000 TSh. (83 US cents)	1000 TSh. (83 US cents)	1000 TSh. (83 US cents)
Internet usage fees per 30 minutes	500 TSh. (42 US cents)	700 TSh. (58 US cents)	700 TSh. (58 US cents)	500 TSh. (42 US cents)
Computer training (per module)	15,000 - 25,000 TSh. (12.5 - 21 US dollars)	25,000 TSh. (21 US dollars)	30,000 TSh. (25 US dollars)	20,000 TSh. (17 US dollars)

Source: Documents and information extracted from telecentres by the researcher

In question 4.3.2, respondents were asked to comment on the prices they were paying for the different services at the telecentres. The majority of the respondents who used internet services said the prices were fair, to them given the conditions under which the telecentres operate. Prices of computer training were condemned by many respondents as being too high. Some respondents indicated that these prices could not be compared with the price of travelling to urban areas, looking for a similar kind of training. For the non-users of the telecentres, prices of services offered were often too high for them. The prices are one of the hindrances to them using the telecentre services.

Computer training was divided into modules at all telecentres and students were charged according to the modules they took. The division of these modules for each telecentre is shown in Table 5.4.3.

Table 5.4.3: Computer training modules for each telecentre

Telecentre	Module	Price in TSh.
Sengerema	**Introduction course** Introduction to computers MS-windows, Internet and email **Intermediate Course** Microsoft word Microsoft Excel **Advance Course** Microsoft access Microsoft Power Point Microsoft publisher **Software installation and hardware configuration** Software Installation and configuration Hardware configuration MS-DOS	15,000 20,000 20,000 25,000
CROMABU	Introduction to PC Microsoft Word 3 Microsoft Excel Internet and email	25,000 each
FADECO	Introduction to PC Microsoft Word Microsoft Excel Internet and email	30,000 each
Ngara	Introduction to computers Uses of information technology Introduction to internet and web surfing Web page development (HTML) Information management using computers Word processing (Microsoft Word 2000) Spreadsheets - (Microsoft Excel) Presentations - (Microsoft Power Point 2000) Database management - (Microsoft Access 2000) Desktop Publisher - (Microsoft publisher 2000) Networking	20,000 each

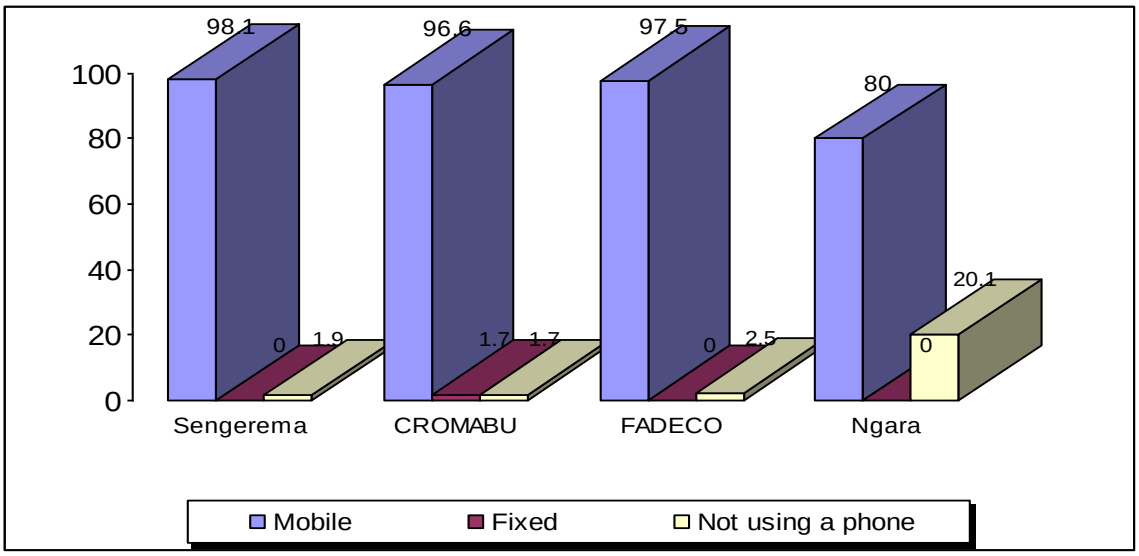
Source: Documents and information extracted from telecentres by the researcher

5.4.8 Telephone access and ownership

The previous section provided information on access to ICT at all the four sites in terms of radio services, television, internet services and other services provided by the telecentres. This

section provides information on ownership and access to telephone services. In question 7.1.1, respondents were asked to indicate the type of telephone they used most. Mobile phones were indicated as the most used type of telephone at all the research sites (see Figure 5.4.10).

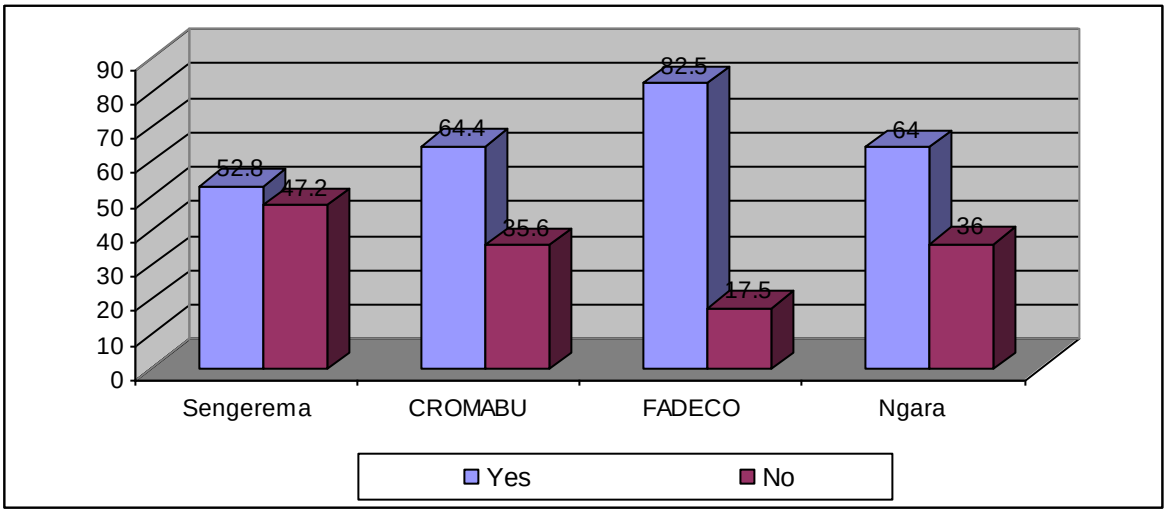
Figure 5.4.10: Type of telephone used the most



N=Sengerema 53, CROMABU 60, FADECO 40, Ngara 50

Since mobile phones were indicated as the most used type of telephone, respondents were asked to indicate whether or not they owned a mobile phone (see Figure 5.4.11). In Sengerema, 52.8% of the respondents said they owned a mobile phone, while 47.2% said they did not. In Magu/CROMABU 64.4% of the respondents owned a mobile phone, while 35.6% did not. In Karagwe/FADECO 82.5% of the respondents owned a mobile phone, while 17.5% did not. In Ngara 64.0% of the respondent owned a mobile phone, while 36 % did not.

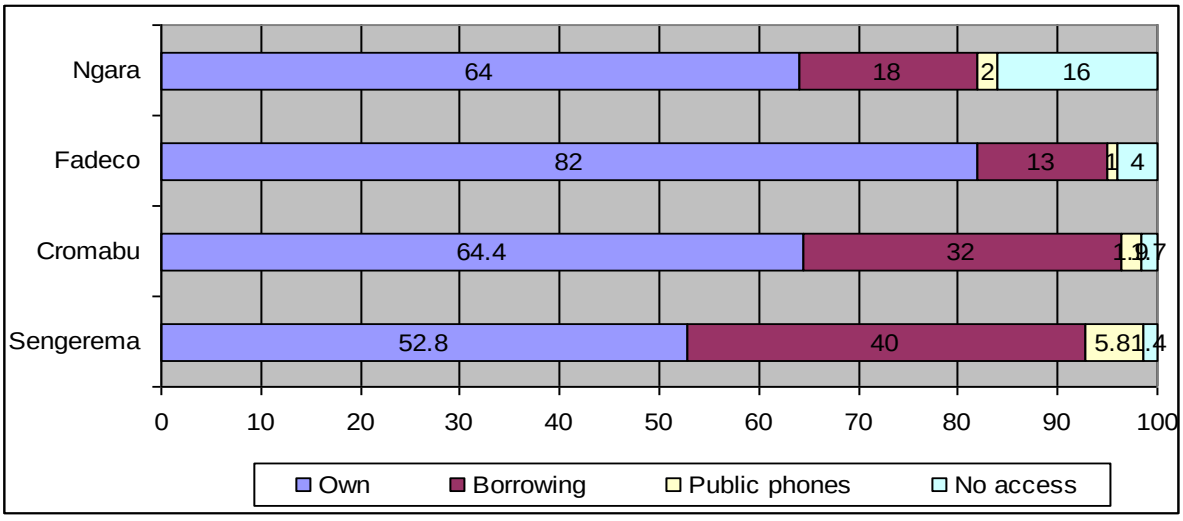
Figure 5.4.11: Mobile phone ownership



N=Sengerema 53, CROMABU 60, FADECO 40, Ngara 50

In question 7.1.3, respondents were asked how they accessed the telephone that they used most (see Figure 5.4.12). The majority of the respondents owned a mobile phone. This was 28 (52%) in Sengerema, 39 (64.4%) in CROMABU, 33 (82.6%) in FADECO and 32 (64%) in Ngara. Borrowing from friends and relatives was indicated as the second most important means of accessing the mobile phone service. The results indicate that few people access mobile phone services through public pay phone services.

Figure 5.4.12: Access to a mobile phone



N=Sengerema 53, CROMABU 60, FADECO 40, Ngara 50

As far as access and use of mobile phones is concerned, this research identified three categories of people (see Figure 5.4.12). These were mobile phone owners, mobile phone users and non-users. Those people who owned their personal mobile phones were called "mobile phone owners". The people who did not have their own mobile, but used other people's mobiles (had access to one), were called "mobile phone users". The people who did not own a mobile phone and did not use other people's mobiles were the "non-users".

Sharing mobile phones with friends and colleagues was seen to be common at all four research sites. Most of the sharing was done on non-commercial terms. People simply helped each other and they enjoyed doing that. Different way of sharing a mobile phone existed.

- The reduced price of the Subscriber Identity Module (SIM) cards, which cost about 500 Tanzanian Shillings (equivalent to 41 US cents), has made these cards affordable to many people. There are people who own a SIM card but cannot afford to buy a mobile phone. A person with only a SIM card places his/her SIM card in a friend's phone to make calls or receive and send SMSs. Thereafter they would remove their SIM cards. This method eliminates the cost to the person who is offering the handset. The cost of the calls goes to the owner of the SIM card, as if they had made the call from their own handsets.
- Buying air-time and loading it into somebody's phone and making a call is another way of sharing a mobile phone. This is made possible by the availability of cheap air-time vouchers. This means that the borrower buys air-time and loads it into the owner's mobile phone. With this arrangement, people are able to borrow other people's handsets at no cost to the owner. Most of the owners will lend other people their phones without charge. When a borrower gets a call later, the owner of the phone will take a message on their behalf. Most of the people who borrowed phones this way do not have the skills to use the phone, so the owner assisted them in loading the air-time and making a call.

Although a relatively large number of people owned, or had access to, a mobile phone, the kind of access that these people had was limited and they faced many challenges. In most cases they had to travel long distances to a place where there was electricity, to charge their

mobile phone's batteries. The mobile phone networks are always patchy, especially in the remote areas, necessitating people to have more than one SIM card and keep changing them to access the available network at the spot where they were.

5.5 Usage patterns of ICTs by people in the selected rural areas of Tanzania

Research question number four sought to identify usage patterns of ICTs by people in the selected rural areas of Tanzania. This was achieved by determining their information needs and their information-seeking patterns and the extent to which ICTs were used in seeking information. Usage patterns of the internet and other ICTs were also identified.

The information needs and information-seeking patterns were identified using the critical incident technique. The technique identified sources and channels of information used and the methods used to acquire information. Information systems and services used were identified. Observations, interviews with users and non-users of the telecentres and focus group discussions (see Appendix 4.8) were used to answer this research question.

5.5.1 Critical incident technique

The critical incident technique is a qualitative, open-ended and retrospective method that examines how people or communities seek information. Respondents were asked why and how they sought information. Through this process their information needs and their information-seeking patterns were identified.

5.5.1.1 Information needs

For the purpose of this study, information need is defined as a situation that arises when a person living in rural areas (rural communities) encounters critical problem-solving, decision-making or question-answering situations that can be resolved through certain information.

Question 8.1 (see Appendix 4.1) sought to establish whether or not the respondents had ever experienced or encountered a need for information concerning any aspect of their livelihoods. Out of the 203 people interviewed in all four research sites, 114 (56.2%) replied affirmatively that they had experienced a need for information. Those who had experienced such needs for information were asked to narrate instances or situations of the need. In each instance,

respondents were asked to indicate the most important question they needed to answer, or the most important thing they wanted to learn, find out, understand better or just think about. One hundred and thirty seven frequencies were recorded on this item. Some of the respondents recorded more than one instance, thus making the number of instances recorded higher than the number of the respondents who had experienced a need for information.

The instances stated by the respondents were grouped into categories, as shown in Table 5.5.1.

Other minor categories included

- Legal information 2 (1.5%)
- Information on various artistic activities such as promotion and advertising, sponsorship and marketing 2 (1.5%)
- Information on livestock-keeping 1 (0.7%)
- Entertainment 1 (0.7%)
- Research-related information 1 (0.7%)

The context for the majority of the instances/situations mentioned by the respondents was work/business related 98 (72%). The rest were concerned with personal problems 10 (7.3%); school-related problems (19 or 13. 87%) and health-related problems 9 (6.6%).

Table 5.5.1: Categories of the respondents' information needs

Categories	Explanations
The need for business information 44 (32.1%)	Included respondents who had encountered the need for new business ideas, expanding and financing business and information on how to manage business effectively.
The need for agricultural information 24 (17.5%)	Included respondents who had encountered the need for information on how to increase production and how to manage pests. It included those who had encountered the need for marketing and price information for their produce. Instances related to information on seasonal variations and information on how to start and finance irrigation schemes fell into this category.
Educational / school related information 19 (13. 9%)	Included respondents who had encountered a need for information on colleges and scholarship information. It included those who had been in need of information on secondary school and teachers colleges' examination results for themselves or their children.
Career development 11 (8%)	Included respondents who had encountered the need for information on new skills development and employment opportunities.
Family/personal problems 10 (7.3%)	Included respondents who had encountered the need for information on issues such as marital problems, dealing with divorce, teenage pregnancy, finance, in case of an emergency in a family, and death of parent or close member of the family.
Health issues 9 (6.6%)	Included respondents who had encountered the need for information on health issues such as AIDS disease, HIV prevention and management of childhood diseases.
NGO activities 6 (4.4%)	Included respondents who had encountered the need for information on NGO-related activities such as fund-raising and communication with donors. It included those who needed information on how to retain existing donors and keep in touch with them.
Government-related information 4 (3%)	Included respondents who had encountered the need for information on taxation and other government programmes, such micro-credit schemes for farmers and small-scale businesses.
Loan and micro-credit facilities 3 (2.2%)	Included respondents who needed information on loans and other forms of micro-credit facilities from NGOs and other micro-credit organisations.

In question 8.4, respondents were asked to explain how often they had experienced such situations/instances. The majority, 93 (82%), said they often experience such instances.

In question 8.5, respondents were asked whether or not they attempted to arrive at a decision or answer the question or solve the problem. The aim of this question was to establish if respondents tried to find information concerning their problem-solving, decision-making or question-answering situations. Of the 114 respondents who said they had experienced the need for information, 106 (93%) indicated that they attempted to answer the question or solve the problem.

5.5.1.2 Information-seeking patterns

In question 8.6, respondents were asked to indicate how or where, or from whom, they received the answers. This question aimed at establishing the sources of information used by the respondents. A total of 163 responses were recorded on this question. This means that some of the respondents indicated more than one source of information. The majority of the respondents 65 (39.9%) indicated that friends and relatives were their main source of information. The second largest source of information was the radio. A total of 20 (12.3%) respondents indicated that they used the radio for sourcing information.

Seventeen respondents (10.4%) indicated that internet services provided by the telecentres were their sources of information. Through probing and asking follow up questions it was discovered that this was mainly for activities such as education and career development.

Other services provided by the telecentres, such as agricultural and marketing information services, were recorded by 16 (9.8%) as their main sources of information. This was mainly in the case of people (especially farmers) who came to the telecentre for consultation on various issues such as prices of agricultural products and marketing. Other sources of information that were used by the respondents were personal experiences 15 (9.2%), telephone communication with relevant authorities 9 (5.5%), health centres 5 (3.2%), churches 7 (4.3%), local authorities 6 (3.7%) and extension officers 3 (1.8%).

5.5.2 Websites commonly visited

In question 5.1 (see Appendix 4.1), respondents who were internet users were asked to indicate web sites that they often browsed. This was a multiple response question and

therefore most respondents indicated more than one website. The number of internet users at each research site and the total number of responses recorded at each site are given in Table 5.5.2.

Table: 5.5.2: Internet users in each telecentre

Telecentre	Internet users	Recorded responses
Sengerema	20 (37.7%)	78
CROMABU	10 (16.6%)	28
FADECO	14 (35%)	33
Ngara	19 (38%)	57
Total	**63**	**196**

Figure 5.5.1: Websites commonly visited

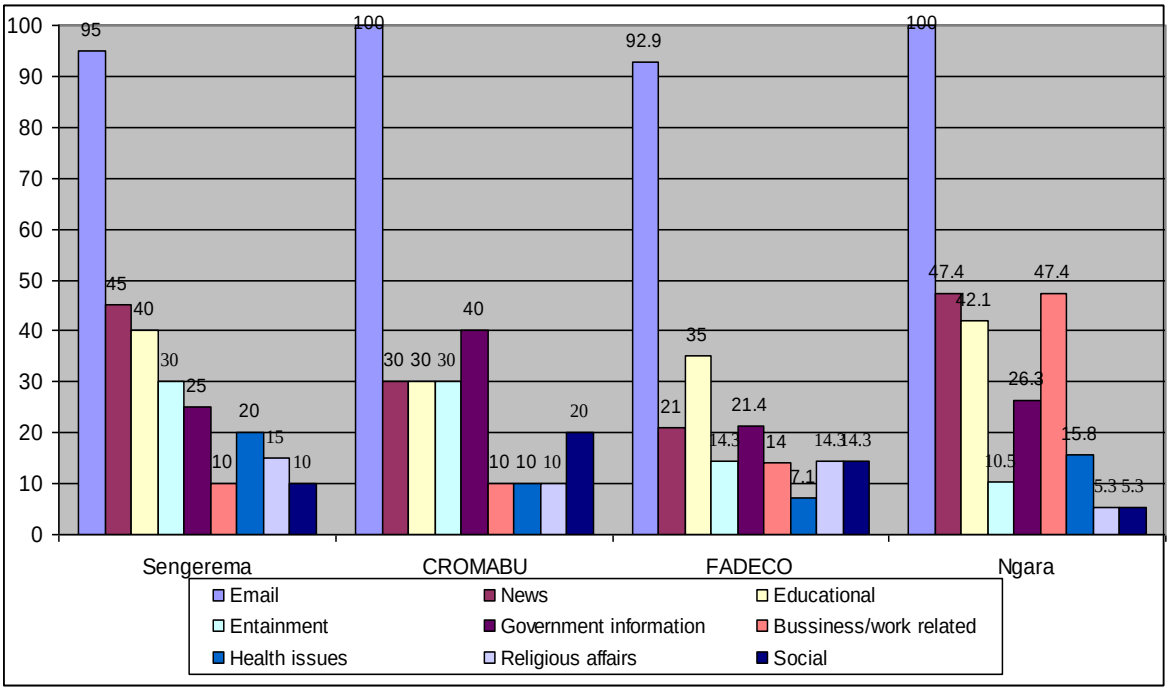


Figure 5.5.1 show the results of question 5.1. The majority of the respondents said that they mainly used the internet for web-based email. Twenty respondents (95%) in Sengerema, 10 (100%) in CROMABU, 14 (92.9%) in FADECO and 19 (100%) in Ngara said that they mainly used the internet for web-based emails. A total of 9 respondents (45%) in Sengerema, 3 (30%) in CROMABU, 3 (21.4%) in FADECO and 9 (47.4%) in Ngara only visited news-

related websites such as www.bbcnews.com for international news and www.ippmedia.com for local news.

Other commonly visited websites were those of government ministries and other government agencies. This was evidenced by 3 (25%) of the respondents in Sengerema, 4 (40%) in CROMABU, 3 (21.4%) in FADECO and 5 (26.3%) in Ngara. Most of these respondents indicated that they often visited the Tanzania National Examination Council Website http://www.necta.go.tz/ and the Tanzania Education Website http://www.tanedu.org/.

These two websites were launched in 2003. They provide information about education services in Tanzania, contact information of secondary schools and teachers' colleges in Tanzania and general news concerning the education sector in Tanzania. The most important information provided by these two sites is the examination results for secondary school leavers and teachers' colleges. Most respondents said they can now access these examination results easily and quickly, using internet services provided by the telecentres.

In the past, hard copies of these results were distributed to regional and district offices all over Tanzania. A large amount of time was used in the distribution of the results papers to the responsible persons in the rural areas. In most cases, people in rural areas had to travel to urban areas to access these results. Many times there would be students in colleges and universities could not enrol at tertiary institutions due to lost or delayed examination results. With the new internet system, however, candidates receive their results early and are able to join institutions of higher learning without delay.

At CROMABU telecentre, the management made extra efforts to ensure that people were aware that they could easily access their examination results from the telecentre. The telecentre hired someone with a bicycle and a megaphone to cycle into the villages and tell people that they could access their results from the telecentre.

Other websites that were commonly visited were the websites related to education, admission to universities and scholarship applications. This was mentioned by 8 (40%) of the respondents in Sengerema, 3 (30%) in CROMABU, 5 (35%) in FADECO and 8 (42.1%) in Ngara.

5.5.3 Websites commonly visited: observation of internet search histories

The data on websites commonly visited was compared with the data collected by observation of the websites commonly visited from 'internet search histories'[14] on the computers. In this case, the research recorded all the 'search histories' from all the computers used by the public in the telecentres. The number of computers for which search histories were recorded were seven in Sengerema, six in CROMABU, five in FADECO and seven in Ngara. The search histories were then grouped into thirteen categories, as shown in Table 5.5.3.

Table 5.5.3: Websites commonly visited: observation of internet search histories

Website commonly visited from search histories	Sengerema		CROMABU		FADECO		Ngara	
	Score	%	Score	%	Score	%	Score	%
Web-based email	39	18.7	67	42.9	61	56.0	156	54.7
Pornography	67	32.1	12	7.7	1	1.0	4	1.4
Friends, dating, etc	18	8.6	6	3.9	-	-	3	1.1
Education related	15	7.2	18	11.7	4	3.7	33	11.6
College and scholarship application	16	7.7	19	12.2	4	3.7	26	9.1
Greeting cards	12	5.7	2	1.5	-	-	2	0.7
Government/ministry/agencies	9	4.3	9	5.9	4	3.7	8	2.8
News	3	1.4	3	1.9	-	-	17	6
Business related	2	1.0	-	-	-	-	-	-
Agriculture	-	-	-	-	17	15.6	-	-
Religious	5	2.4	1	0.6	-	-	7	2.5
Telecentre website	-	-	-	-	9	8.2	-	-
Other	23	11.0	18	11.5	9	8.2	29	10.2
Total	**209**	**100**	**155**	**100**	**109**	**100**	**285**	**100**

As shown in Table 5.5.3, web-based email accounts, such as Yahoo, Hotmail and Google mail, were recorded as the most commonly visited sites. The number of hits recorded for emails were 39 (18.7%) for Sengerema, 67 (42.9%) for CROMABU, 61 (56.0%) for FADECO and 156 (54.7%) for Ngara. These results were consistent with what the respondents said in question 5.1 - that they mostly used the internet for emails.

[14] This is a feature on internet browsers that records history of the internet and past computer activities. By accessing the history feature, one is able to track activities of previous users such as websites visited, images and movies seen and various other activities.

The figures from the search history of other sites visited by the respondents, such as news websites, college/scholarship applications and government agencies' websites concurred with what the respondents had indicated in the interviews. However, the data from observations showed a different pattern and new kinds of websites that were commonly visited by the respondents. These had not been mentioned during the interviews. Observation indicated that other sites visited by the responded were mainly for recreational purposes. These include pornographic sites, dating and other social activities such as greeting cards. The occurrence of pornographic sites in search histories was the highest at the Sengerema telecentre where 67 (32.1%) of all the search histories recorded in computer histories were pornography related. While at the telecentre the researcher observed a group of teenage boys who came to the telecentre after school hours to access pornographic paedophilic[15] material. This was in disregard of the notices in the telecentre that banned the access of such materials by users.

In the case of Sengerema, the use of the internet for pornography access had caused some parents to forbid their children from going to the telecentre. Some church leaders also saw the telecentre as the 'centre of evil' and they discouraged their members from visiting the telecentre. The manager of the telecentre said that he was against such use and added that the management was trying hard to discourage users from visiting the internet for pornographic purposes. One staff-member of the telecentre said that the policy they are working with was to avoid interference with what users were doing on the internet.

This scenario highlights the whole debate on 'digital rights' and 'censorship'[16]. The question is how much control needs to be applied in the use of telecentre and what are the digital rights of users of the internet in telecentres.

5.5.4 Use of the other means of communication, apart from email

In question 5.2, internet users were asked whether or not they used other means of communication, apart from email. In all the sites, internet users said they used other means of

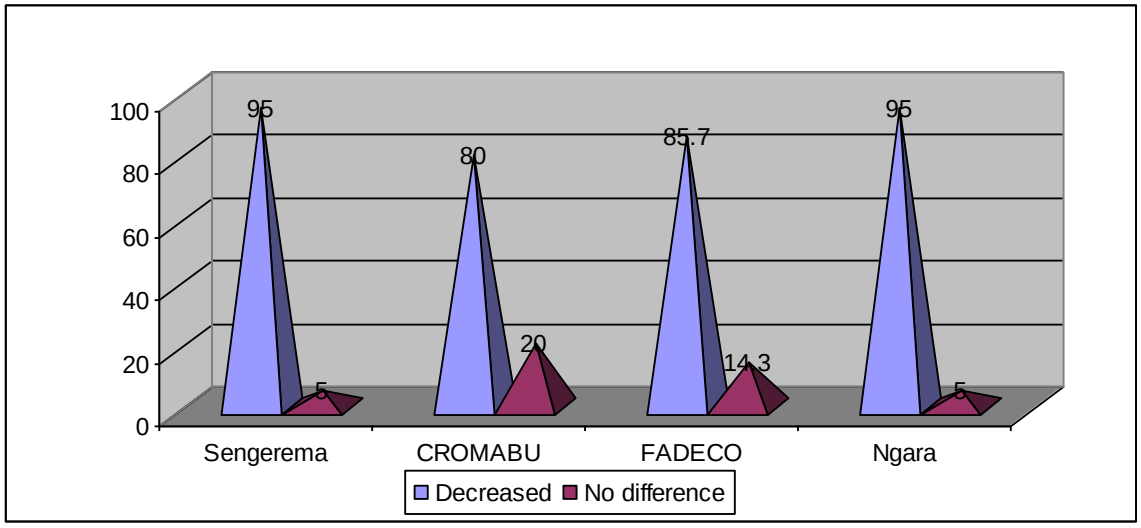
[15] Illegal sexual activities involving children
[16] Digital rights covers: freedom of expression on the internet, freedom of access to information on the internet, freedom of communication and the liability of content providers or data carriers. Censorship involves multiple ways that may be applied to restrict these rights to individuals. These concepts are discussed in Chapter Six.

communication, apart from email. In questions 5.3.1 to 5.3.9 internet users were asked to indicate whether or not their use of other means of communication had increased or decreased since they started using internet. The results of this question are discussed from section 5.5.4.1 to section 5.5.4.6 and they are not given here.

5.5.4.1 Use of letters and the post office

The majority of internet users at all research sites indicated that the use of letters and post office service had decreased since they started using the internet. These included 19 (95%) in Sengerema, 8 (80%) in CROMABU, 12 (85.7%) in FADECO and 18 (95%) in Ngara, as shown in Figure 5.5.2. At the time of this research the respondents said that they mainly used post office services for sending parcels, money orders and other such services. They elaborated that they could now send letters, even outside the country, relatively faster. They observed that the cost of sending those letters had decreased significantly.

Figure 5.5.2: Use of letters and post office



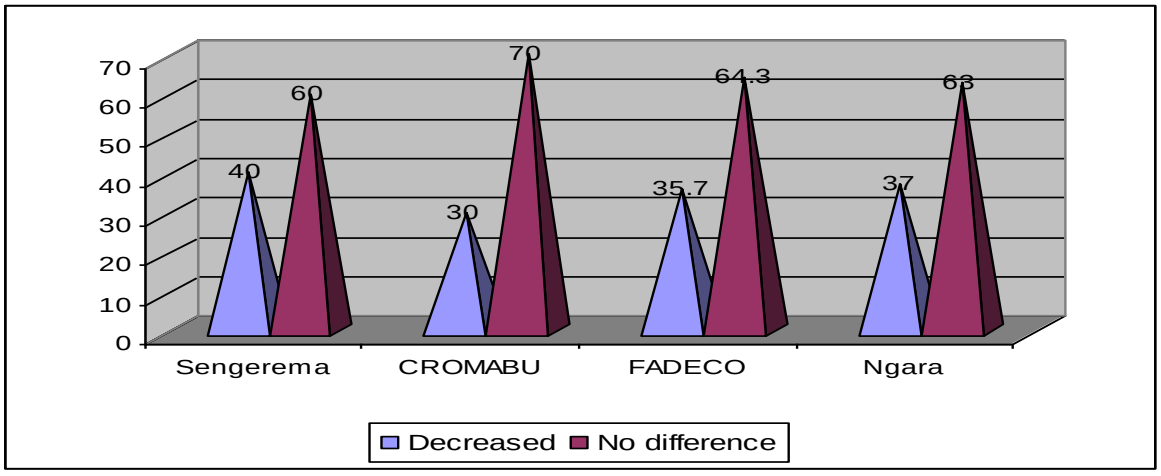
N=Sengerema 20, CROMABU 10, FADECO 14, Ngara 19

5.5.4.2 Face-to-face communication

In question 5.3.2, respondents were asked if face-to-face communication had decreased since they started using the internet. The majority of the respondents indicated that there was not much difference as far as face-to-face communication was concerned since they started using

the internet. This included 12 (60%) in Sengerema, 7 (70%) in CROMABU, 9 (64.3%) in FADECO and 12 (63.2%) in Ngara, as shown in Figure 5.5.3. The major reason for this trend was that the majority of the internet users communicated with people who were outside their communities. For a few respondents the use of the internet had led to a decrease in face-to-face communication. This was especially true for internet users who had relatives in urban areas. Workers and employees of organisations (especially NGOs), which have their headquarters in urban areas, said that internet was helping them to keep in touch with their headquarters. The internet was therefore seen to have reduced unnecessary travel and costly face-to-face meetings.

Figure 5.5.3: Face-to-face communication

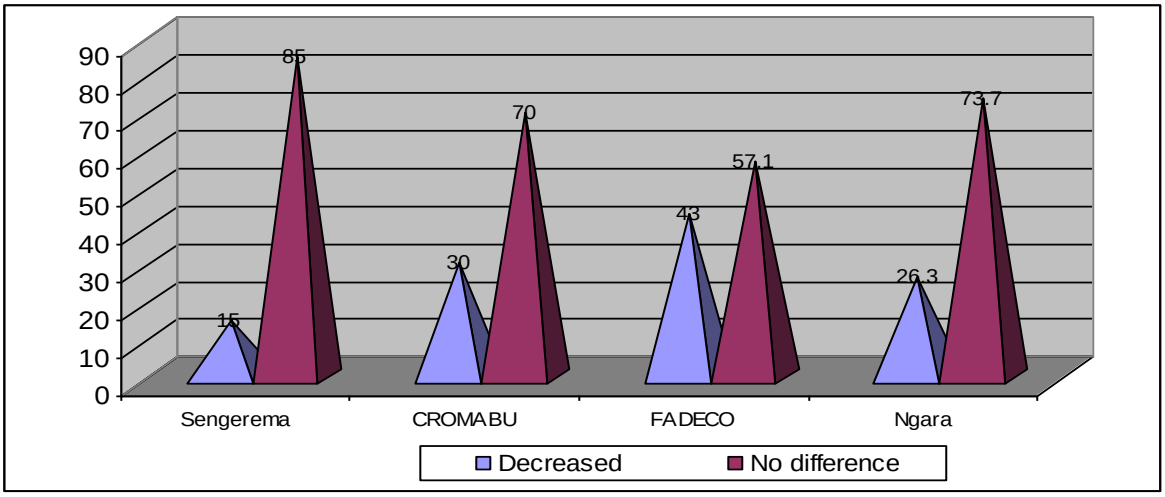


N=Sengerema 20, CROMABU 10, FADECO 14, Ngara 19

5.5.4.3 Making social visits

As shown in Figure 5.5.4, few respondents indicated that their social visits to friends and relatives had decreased since they started using the internet. Reduced social visits as a result of the use of internet was reported by 3(15%) respondents in Sengerema, 3(30%) in CROMABU, 6 (43%) in FADECO and 5 (26.3) in Ngara. Part of the reason for this is the fact that most of the respondents used web-based email accounts to communicate with people outside their communities.

Figure 5.5.4: Making social visits

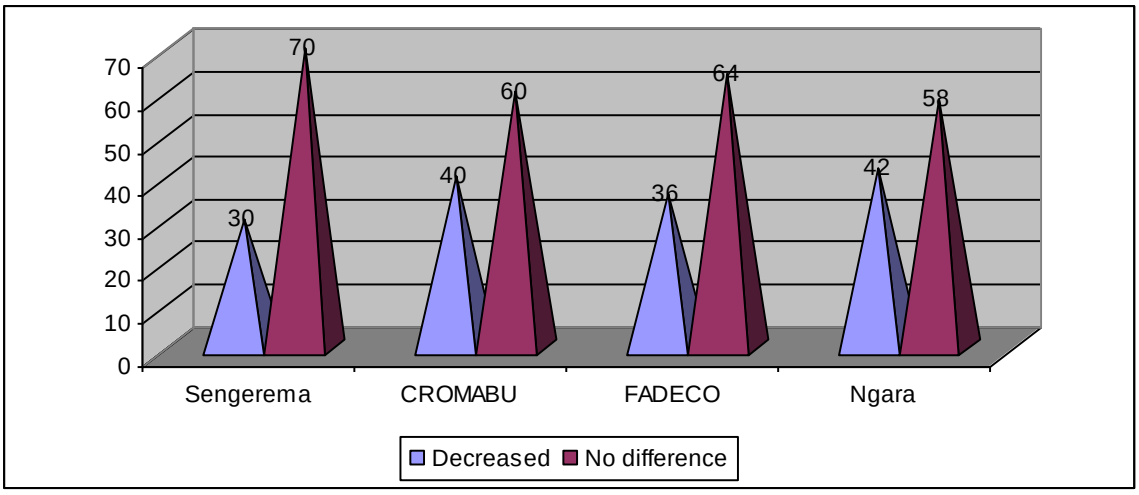


N=Sengerema 20, CROMABU 10, FADECO 14, Ngara 19

5.5.4.4 Use of public phones

As indicated in Figure 5.5.5, most of the respondents indicated that there was not much difference in the use of public phones caused by the use of the internet. This was reported by 14 (70%) of the respondents in Sengerema, 6 (60%) in CROMABU, 9 (64%) in FADECO and 11(58%) in Ngara.

Figure 5.5.5: Use of public phones



N=Sengerema 20, CROMABU 10, FADECO 14, Ngara 19

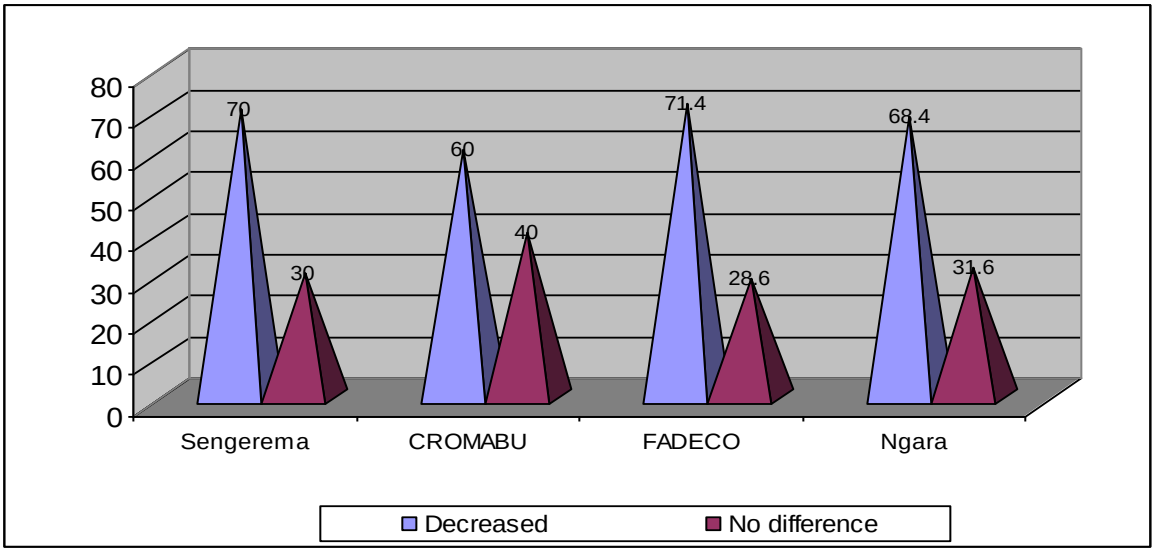
5.5.4.5 Use of newspapers

Fourteen internet users in Sengerema (70%), six (60%) in CROMABU, 10 (71.43%) in FADECO and 13 (68.40%) in Ngara indicated that their use of the internet had significantly

reduced their use of hard-copy newspapers (see Figure 5.5.6). They said that they could now read current news on the internet and even follow up the development of certain news items on the internet.

In remote places like Ngara, there was only one person in the entire district who sold newspapers. The district received newspapers twice a week. In that district, the internet had become the source of news and information for those who could afford to use it. In Magu district, one respondent said that, in the past, examination results for secondary school students were published in newspapers. These results had been published is small batches in different newspapers for a period of two weeks or more. People were forced to buy several newspapers until they got the one with the results they wanted. With internet services they can now access their results fast, easily and at a lower cost.

Figure 5.5.6: Use of newspapers



N=Sengerema 20, CROMABU 10, FADECO 14, Ngara 19

5.5.4.6 Referral to village council

All the internet users answered that the use of the internet has not decreased referral to the village council for various services. This is mainly because the village council office did not use the internet in any way to deliver its services to the people.

5.6 Impact of ICTs on livelihoods

Research question number five sought to determine the impact of the use of ICTs on various aspects of the livelihoods of the people living in the selected rural areas of Tanzania. The study investigated the impact of the use of ICTs on three of the five capital assets of the sustainable livelihood framework (refer to section 3.4.4 in Chapter Three). These included:

- Human capital, which represents skills, knowledge, ability to labour, attributes and expertise embodied in people and acquired through investments in formal or informal education, training, or learning by doing;
- Social capital, which represents the genre of social resources upon which people draw in pursuit of their livelihood objectives. It consists of networks, participation in social or productive groups and mutually-beneficial relationships; and
- Financial capital, which represents financial resources that people use to achieve their livelihoods, such as available stocks, which can be held in several forms such as cash, bank deposits, liquid assets (livestock and jewellery), or resources obtained through credit-providing institutions and regular inflows of money, including earned income, pensions and other transfers from the state and remittances.

Data for this research question is captured from the interview with users and non-users of the telecentres and from focus group discussions, see Appendix 4.8.

5.6.1 Community-related problems faced before the telecentre project was initiated

In question 6.1, respondents were asked to indicate the three biggest community-related problems they faced before the telecentre project was initiated. This was a un-structured question, whereby different answers were given by the respondents. The answers were later grouped into categories, as shown in Table 5.6.2. The question was a multiple-response one, in which some respondents provided more than one answer. The total number of responses for this question (6.1) is shown in Table 5.6.1.

Table 5.6.1: Respondents interviewed and responses recorded

Telecentre	Total No. of respondents interviewed	Recorded responses
Sengerema	53	62
CROMABU	60	43
FADECO	40	28
Ngara	50	26
Total	**203**	**157**

As shown in Table 5.6.1, the total number of respondents interviewed in all the telecentres was 203 and the total number of responses recorded for question 6.1 was 157. The majority of the respondents who answered this question were telecentre users and those who were actively involved with telecentre activities. The telecentre non-users accounted for most of the non-response to this question. The reason for this was the fact that most telecentre non-users were not aware of the telecentres and the activities of the telecentres. This lack of awareness made it difficult for them to associate the community problems they were facing with the telecentres. The community-related problems faced before the telecentre project came in, as indicated by the respondents, are shown in Table 5.6.2.

Table 5.6.2: Community-related problems faced before the telecentre project was initiated

Community-related problems faced	Sengerema		CROMABU (Magu)		FADECO (Karagwe)		Ngara	
	No	%	No	%	No	%	No	%
Lack of access to computers	5	8	2	4.7	2	7.1	2	7.7
Lack of access to information	8	13	8	19	8	28.6	5	19.2
Lack of jobs	8	13	2	4.7	3	10.7	1	3.8
Lack of means of communication	4	6.5	6	13.9	7	25	8	30.8
Lack of computer training	2	3.2	5	11.6	5	18	7	27
Lack of pricing information	-	-	11	25.6	3	10.7	3	11.5
Lack of secretarial services	-	-	7	16.3	-	-	-	-
Lack of access to local news and information	36	58.1	2	4.7	-	-	-	-
Total	**62**	**100**	**43**	**100**	**28**	**100**	**26**	**100**

As shown in Table 5.6.2, in Sengerema three important community-related problems which were experienced before the telecentre project came in, as judged by the number of people who mentioned them, were lack of access to local news and information 36 (58.1%), lack of access to information eight (13%) and lack of jobs 8 (13%). In Magu, the three important community-related problems experienced, before the telecentre project came in, were lack of pricing information for agricultural products 11 (25.6%), lack of access to information 8 (19%) and lack of access to secretarial services 7 (16.3%). In Karagwe, the three important community-related problems experienced, before the telecentre project came in, were lack of access to information 8 (28.6%), lack of means of communication 7 (25%) and lack of computer training 5 (18%). In Ngara, the three important community-related problems experienced, before the telecentre project came in, were the lack of means of communication 8 (30.8%), lack of computer training 7 (27%) and lack of access to information 5 (19.2).

In question 6.1.1, the respondents were asked to indicate, in their own personal opinions whether or not these problems had been solved since the telecentre was introduced. Respondents indicated that most of the problems mentioned have been resolved.

5.6.1.1 Lack of access to information

Lack of access to information was mentioned in all four communities as one of the problems that were facing the communities before the telecentre projects came in. Respondents indicated that with the establishment of the telecentre they were now able to access various kinds of information from the internet, seminar, workshop and other functions arranged by the telecentres. The respondents stated that they were able to access information about education and available opportunities for further studies, as well as examination results for secondary schools and colleges. In Ngara, respondents said that the telecentre had increased public access to the internet. In the past it was only being used by a few people working with relief agencies for refugees. In Karagwe, respondents said that the telecentre normally organised seminars and workshops, which gave people opportunities to learn new ideas. When the present author was at FADECO telecentre she participated in a half day workshop organised by the manager of the telecentre and a local church-based NGO.

The purpose of the seminar was to encourage young people to make use of Jatropha[17] seeds, which are widely available in Karagwe. The young people were encouraged to start collecting Jatropha seeds from available trees. They were encouraged to plant new Jatropha tress. The young people were told how to extract Jatropha oil locally and use the oil as a source of fuel for oil lamps and for soap-making. At the end of the workshop, the young people were referred to the website <www.jatropha.org> for further information.

Figure 5.6.1: Jatropha oil demonstration at FADECO telecentre

The manager of FADECO telecentre (Mr. Sekiku, in light-green T-shirt) demonstrating Jatropha oil and its use to a group of young people at FADECO telecentre computer training room. The bag shown in picture 1 is full of Jatropha seeds collected from the villages.

5.6.1.2 Lack of access to local news and information

Lack of access to local news and information was mentioned as one of the problems that was facing Sengerema community before the telecentre project came in. The respondents indicated that this problem was solved after the telecentre started a community radio. With the community radio, people of Sengerema enjoy full coverage of news and information originating from their vicinity.

[17] Jatropha is a small tree originating from Central America. The plant was first introduced to farmers in Africa as a hedge tree, because its leaves and fruits are poisonous and cannot be browsed by animals. However, recent scientific discovery showed that Jatropha's seeds are extraordinarily rich in oil that can be turned into soap or motor fuel. Jatropha is currently known as a 'bio-fuel plant' or 'diesel tree'.

With the Sengerema community radio in place people of Sengerema are able to communicate with the wider Sengerema community, in case of death announcements, business advertisements and various kinds of events happening in the society. They are able to report missing children and missing livestock. The radio is helping the community in terms of security through reporting and warning people of con-men and fraud-related activities. This makes people aware of such activities and enables them to take precautions. People of Sengerema are able to send greetings to one another through the community radio, thereby strengthening the social fabric of the society.

5.6.1.3 Lack of pricing information for agricultural products

The lack of pricing information for agricultural products was reported in the Magu district as one of the problems faced by the community before the arrival of the telecentre. Respondents indicated that, before the telecentre project was initiated, they used to sell their agricultural products at a loss. However, the telecentre introduced agricultural pricing information services where farmers are able to know the price of their product in various markets within Magu and in the surrounding markets. This service enabled farmers to have bargaining power over the middle men, who previously used to buy agricultural products from farmers at a very low price, which was not market-related.

The respondents said that they were now able to predict prices of their products, even before planting them. This enables production with a market target and thus better profit margins. The agricultural pricing information services has encouraged farmers to start producing alternative cash crops which, in the past, were not regarded as cash crops, these included fruit and vegetables, lentils, soybeans and small green beans, commonly known as '*Choroko*' in Tanzania.

5.6.1.4 Lack of computer training

Lack of computer training was mentioned as one of the problems that was facing communities before the telecentre project started. That was particularly the case in Karagwe and Ngara. In all the communities visited, telecentres were the only places where people could be trained on

how to use computers. For most respondents, the opportunity to attend such training nearby, in the telecentres, without having to travel to the urban areas, was a big advantage.

5.6.1.5 Lack of access to secretarial services

The lack of access to secretarial services was raised in the case of CROMABU. Respondents said that before the telecentre project they were unable to photocopy documents. They always had to travel to the urban areas, in this case Mwanza city (20 kilometres away), to get typing or photocopying done.

5.6.1.6 Other community problems raised during focus group discussions

Data from focus group discussions revealed more problems that communities faced before the telecentre projects were initiated. Some of these problems were completely resolved by the telecentre projects and others were partially resolved. However, due to the nature of some of the problem, the telecentre could not have a direct effect on their resolution, unless the telecentre management made a deliberate effort to influence the government and other relevant authorities to address them.

Problems which the telecentre played a part in solving included communication difficulties with urban centres and other places outside the districts. Lack of internal communication within the district in Sengerema was solved by the availability of the community radio. The respondents pointed out that the Sengerema community radio is helping in passing news and information to all the people in the community. One respondent said the radio operates like a "talking drum"[18] for the district.

The partially solved problems included decreased prices of traditional cash crops such as cotton for Sengerema and Magu and coffee for Karagwe and Ngara. That was associated with weak marketing structures for such crops and this mostly benefited middle men more than farmers. The problem was partially solved in Magu and Karagwe, where the telecentres

[18] In East Africa drums served as an early form of long-distance communication and were used during ceremonial and religious functions. Natives used drum telegraphy to communicate with each other from far away for centuries. The drums were said to be talking when the player regulated the pitch of the drum to produce highly informative sounds to convey complicated messages

provided marketing information to farmers. Even with marketing information service in place, this problem is far from over. Respondents in Karagwe and Magu requested the telecentre to do more in ensuring that farmers receive fair prices when selling their crops. Another respondent in Ngara said the incoming community radio stations should act as a 'mouth-piece', not only for politicians but also for farmers to explain their problems.

Other problems which were partially solved by the telecentre were the lack of news and information in the Ngara district. The district was receiving newspapers only twice a week and people rely on expensive satellite televisions for news, information and entertainment. However, with internet accessibility people of Ngara are able to access current news and information from the internet.

Other problems mentioned, and on which the telecentre had little influence, were poor roads between the district and the regional centres, especially in Sengerema and Karagwe; inflation and high prices of foodstuff in Sengerema, lack of teachers in the district primary and secondary schools in Sengerema, alcoholism in Ngara and environmental degradation and soil erosion in Karagwe.

5.6.2 Community members' expectations of the telecentre

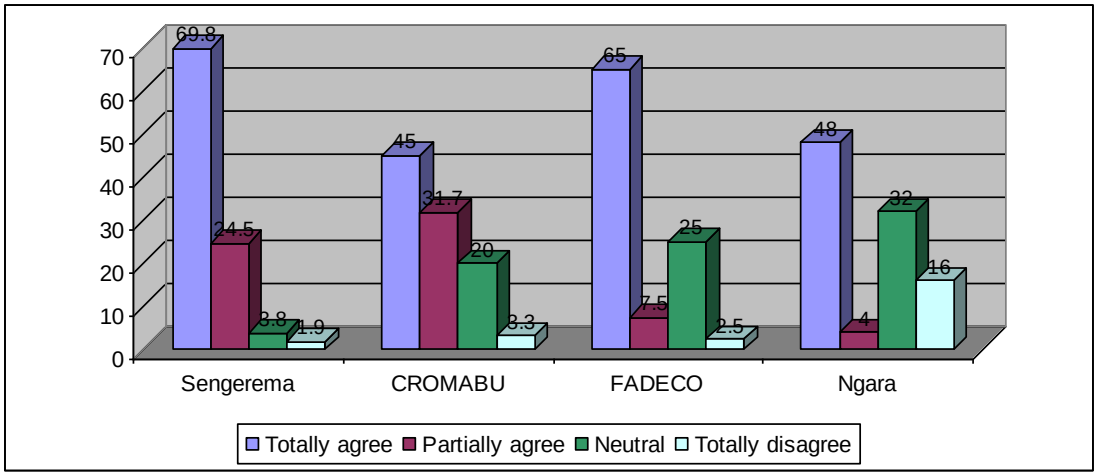
In question 6.1.2, respondents were asked to rate their expectations of the telecentre. This was a closed-ended question, where respondents were required to choose their answers from a five-points scale, ranging from 'Totally agree' to 'Totally disagree'.

5.6.2.1 The telecentre had led to more communication among residents

As shown in Fig. 5.6.2, the majority of respondents indicated that they totally agreed with the statement that the telecentres had led to more communication among residents. This was especially the case in Sengerema, where 37 (69.8%) respondents said that they totally agreed with the statement that the telecentre had led to more communication among residents. This was followed by FADECO 26 (65%), Ngara 24 (48%) and lastly CROMABU 27 (45%). The reason for this was that, for most people, together with the service they received from the telecentre, the telecentre provided a meeting place where people met on formal or informal

arrangements. For instance, in Sengerema the telecentre is a meeting place for various groups of people such as the youth, old people, women and the disabled. The telecentre facilitated the formation of such groups. Exchange greetings on the radio helped people to communicate and stay in touch with one another. CROMABU has organised farmers into groups. Farmers meet, share experiences and glean various kinds of information from CROMABU.

Figure 5.6.2: More communication among residents

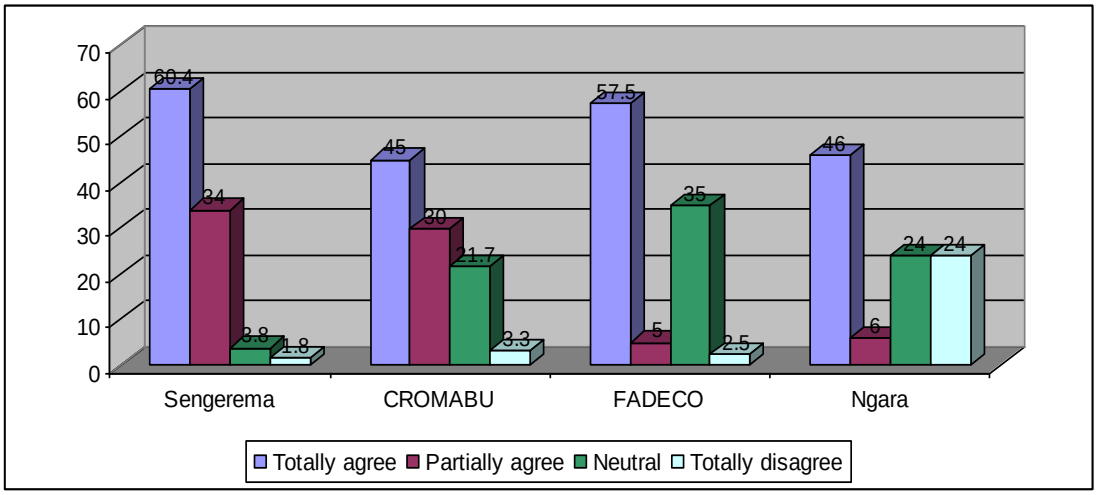


N=Sengerema 53, CROMABU 60, FADECO 40, Ngara 50

5.6.2.2 The telecentre had led to stronger social cohesion among residents

As shown in Figure 5.6.3, the majority of the respondents indicated that they totally agreed with the statement that the telecentre had led to a stronger social cohesion among residents. This was especially the case in Sengerema, where 32 (60.4%) said that they totally agreed with the statement. This was followed by FADECO 23 (57.5%), Ngara 23 (46%) and CROMABU 27 (45%). The reason for this, as stated by the respondents, is that the frequent communication and more contact among the residents strengthened the social cohesion of the society.

Figure 5.6.3: Stronger social cohesion

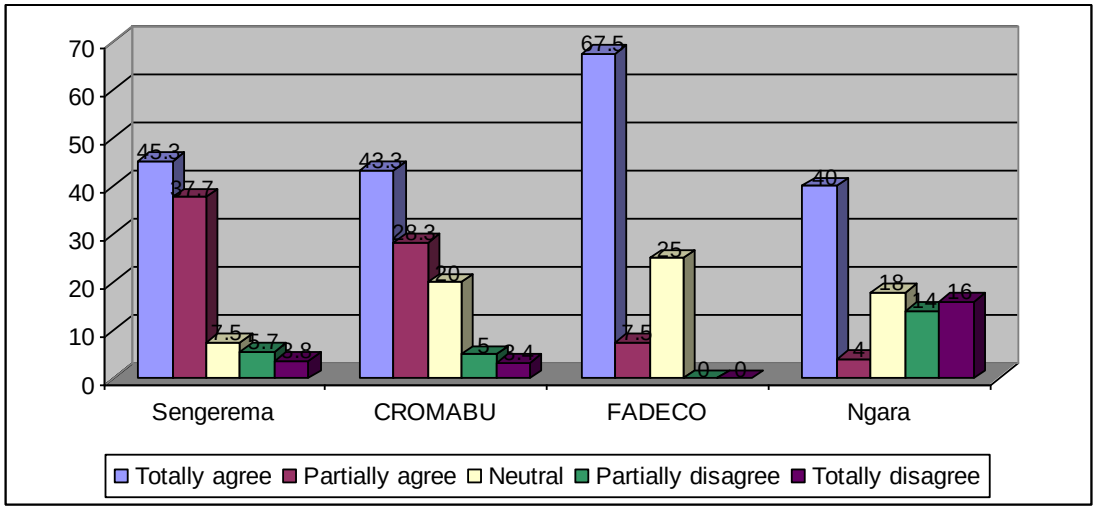


N=Sengerema 53, CROMABU 60, FADECO 40, Ngara 50

5.6.2.3 The telecentre had led to increased income of the people in the community

As shown in Figure 5.6.4, the majority of the respondents indicated that they totally agreed with the statement that the telecentre had led to increased income of the people in the community. This was especially the case in FADECO, where 27 (67.5%) respondents said that they totally agreed with the statement. This was followed by Sengerema 24 (45.3%), CROMABU 26 (43.3%) and Ngara 20 (40%). The high ratings of the telecentre in relation to increased income of the people in the communities could be attributed to services such as agricultural marketing information services in FADECO and CROMABU which increases farmers' income. Advertising in Sengerema community radio helped businesses to grow and expand and created more income to the owners. The high number of respondents with "neutral" and "totally disagree" responses in Ngara could be attributed to low awareness of the telecentre activities and lack of services such as agricultural marketing information services.

Figure 5.6.4: Increased income of the people in the community

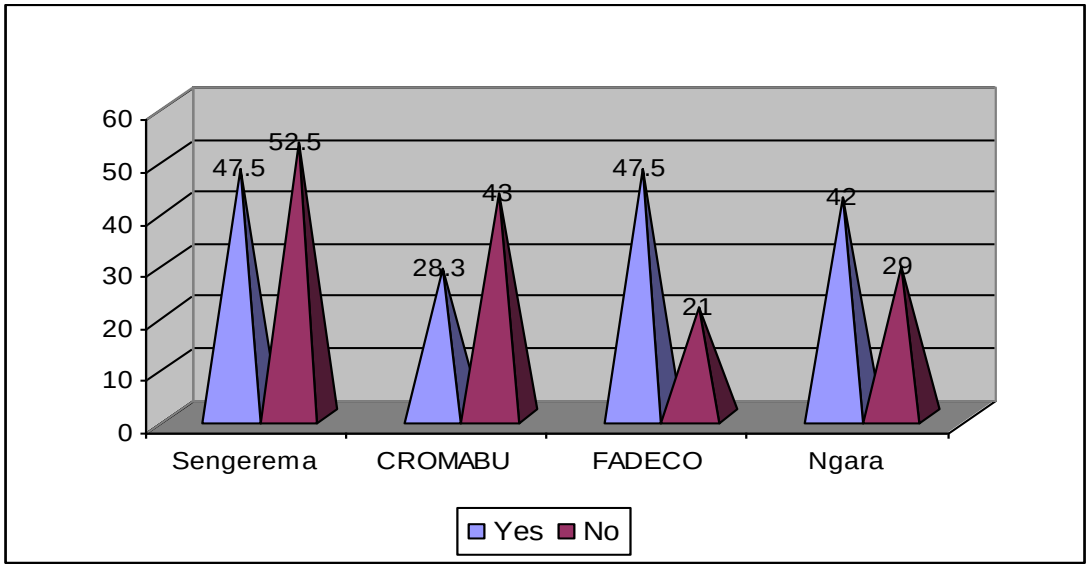


N=Sengerema 53, CROMABU 60, FADECO 40, Ngara 50

5.6.3 Impact of the use of internet/email on human capital

In question 6.2.1, respondents were asked if they had ever attended computer training classes at the telecentre or in other places. Respondents were asked to provide a 'Yes' or a 'No' answer to the question. The results of the question are shown in Figure 5.6.5.

Figure 5.6.5: Attendance at computer training classes at the telecentre



N=Sengerema 53, CROMABU 60, FADECO 40, Ngara 50

In Sengerema, 25 (47.5%) respondents said that they were trained how to use computers. In CROMABU, 17 (28.3%) respondents said that they had been trained by the telecentre on how to use computers. Nineteen (47.5%) respondents in FADECO and 21 (42.0%) in Ngara said that they had been trained how to use computers. The majority of these people had received their training from the telecentre. Records of the telecentre indicated that a fairly large number of people had been trained since the telecentre started.

In question 6.2.3, respondents were asked to indicate the way in which the training had been useful to them. This was an open-ended question. Various answers were received from the respondents. These are discussed below.

- Training at the telecentres was found to have enabled respondents to use the internet. Consequently, respondents have been able to communicate with people, friends, and relatives located elsewhere in the world.

- For business people, computer knowledge was found to have made their businesses more efficient. The ability to use word processing and spreadsheet programs enabled them to keep their business records easily and neatly.

- For young people and school-leavers who could not proceed with their studies, the training was found to have enabled them to find employment. Such jobs included employment in secretarial service shops.

- For certain special cases, the telecentre computer training was found to have literally created jobs. A good case in point was in CROMABU telecentre, where a young man called Paul Masanja was trained by the telecentre and used the telecentre facility to enrol for e-learning courses in medicine with the American Society of Eco-cardiograph and Tele-diagnostic Company. After finishing this programme, he qualified as a referral doctor and is currently offering tele-medicine services. Dr. Paul Masanja, also known as the ‘Web physician’, offers telemedicine services to people in Magu District and Mwanza, in general, in collaboration with medical specialists in the USA. The communication between Dr. Masanja and doctors in America is facilitated by a video link which was donated by the American Society of Eco-cardiograph and Tele-diagnostic Company. Dr.

Masanja connects his video link with any computer connected to the internet. Dr. Masanja does not have an office. He uses the telecentre services to practise tele-medicine by connecting his video link at the CROMABU telecentre. An interview with Dr. Paul Masanja revealed that he has so far helped more than 40 people with various medical conditions, including heart disease and urological complications.

- Another case in which computer training has created employment is that of another young man called David. David was a primary school leaver living in Ngara. He was trained how to use computers for the first time at the telecentre in 2000. After being trained at the telecentre he borrowed the financial capital from micro-finance services provided by a local NGO. He now has a recording and editing company, where he records music and offers video shooting services at various functions. Before 2000 David was a carpenter. He said his new career was inspired by the computer training that he first received at the telecentre. He says he was attending computer classes at the telecentre with eight other young people and all of them were employed in computer-related jobs after finishing the training.
- District office staff and other staff in government and non-governmental institutions had been trained at the telecentre. This has improved their efficiency in their workplaces.

In question 6.2.5 and 6.2.6, respondents were asked to indicate how their investment in the use of the internet had been helpful in knowledge acquisition. Respondents were asked to indicate how they would be affected in terms of knowledge acquisition if they were unable to access the internet any more. A few respondents 8 (4%) in all the telecentres responded to this question. This indicates that few respondents use the internet for knowledge acquisition. The responses for these two questions are provided below.

- The internet had helped them a lot in terms of accessing news and current information. Without the internet they would incur expenses buying newspapers or books to educate themselves on various issues;
- The internet had helped them to learn and be aware of what is happening around the world. Without the internet their knowledge would be out-dated and would lag behind in many current issues;

- One teenaged girl indicated that the internet had helped her learn many things that are facing young people in society such as HIV and AIDS, as well as teenage pregnancy;
- The internet had helped all of the respondents to keep in touch with their friends, relatives and customers.

Focus group discussions revealed more information on the impact of the use of the internet and other telecentre services on human capital. The respondents were asked to indicate the impact that the internet and other telecentre services had on human capital. The answers provided by the respondents are given below.

- The respondents indicated that ICT services provided by the telecentre had greatly helped in terms of education. Many people are now acquiring various opportunities for schooling through listening to the radio, searching the internet and through phone communication with friends and relatives living far away;
- Exam results for secondary school students can easily be accessed from the internet. This makes it easy to follow-up and find information on various education opportunities available within and outside the country;
- In Ngara, the respondents said the telecentre was helping secondary school students. This was because they use the telecentre for learning and supplement what they have studied at school;
- In Sengerema, respondents said the presence of a telecentre in the community helped to reduce the fears that people had about computers. Some people were afraid of the computers because they thought they were very complicated things to use. This phobia is slowly disappearing.

A total of 195 (96%) respondents said that they rarely used the internet for knowledge acquisition. Many said failure to use the internet had less impact on their lives in terms of knowledge acquisition, because they used the internet mainly for email and communication, rather than for knowledge acquisition.

5.6.4 Impact of the use of internet/email on financial capital

In questions 6.4.1 and 6.4.2, respondents were asked to indicate how their investment in the use of the internet had been helpful in economic activities and to indicate how their economic activities would be affected if they were unable to access the internet any more.

Only a few respondents, 10 (5%) in all the telecentres, responded to these questions. The responses for these two questions are provided below.

- Four respondents who owned computer- and ICT-related businesses said that the internet was helping them greatly in their businesses. For instance, two respondents, one in Karagwe and one in Ngara, who owned video-shooting and editing businesses, said that they used the internet for down-loading editing software and antivirus software. They said that without the internet their business would suffer terrible losses, that they would not be able to keep up with changes in technology and hence would become less competitive. Another respondent, in Magu, who owned a secretarial service business, which also deals with designing and printing business cards, invitation cards, posters and logos, said she uses the internet for checking and downloading various card designs. Another respondent, in Ngara, who is dealing with a satellite dish installation business, said he uses the internet in his business. The internet is helping him to find various kinds of technical information for his business, such as frequencies for various television channels.
- Five respondents in Magu said that they used the internet for finding information on prices for their agricultural products in different markets. Therefore the internet contributed directly and significantly to their economic activities. They said that without the internet they would sell their produce at a loss.
- Three respondents working with NGOs and Community Based Organisations (CBOs) said that the internet was helping them to communicate and stay in touch with their sponsor and in that way the internet contributed to the success of their activities.

Focus group discussions revealed more information on the impact of the use of internet/email on financial capital. Respondents were asked to indicate the impact that the internet and other telecentre service had on financial capital. The answers were:

- Services provided by the telecentre help to reduce unnecessary travelling and, in so doing, helps to save time and money;
- The internet helps many people who are looking for employment. Various job opportunities and application for tenders are advertised on the internet.

5.6.5 Impact of the use of internet or web/email on social capital

In questions 6.5.1 and 6.5.2, respondents were asked to indicate how their investment in the use of the internet had been helpful in social communication. Respondents were asked to indicate how they would be affected socially if they were unable to access the internet any more. The responses to these two questions are provided below.

The majority of the respondents indicated that they depended heavily on email to communicate with their relatives living in other regions of Tanzania. Very few were communicating with their friends and family who are outside the country. They said that this kind of communication helps them to stay in touch with their relatives. All of them said that without the internet they would fail to communicate with email but that would have little impact on their social communications. This is because they could still communicate with most of their relatives by other means of communication, such as using the telephone.

Focus group discussions revealed more information on the relationship between the use of internet/email on social capital. The respondents were asked to indicate the impact that the internet and other telecentre services have on the social capital. In Sengerema and Magu, the telecentre works with groups of people, to try to reach the majority with their services. These groups play an important role in strengthening the social capital of the society. The social capital provided by the group helped provide a means for members to share problems and live together. In the two districts this group also operates as a savings and credit co-operative society (SACCOS). The main objective of such co-operative societies is to mobilise savings from members to create a pool of funds from which they can make loans at fair and reasonable rates of interest.

5.6.6 Impact of the use of telephones on human capital

In questions 7.3.1 and 7.3.2, respondents were asked to indicate how their investment in mobile phones had been helpful in knowledge acquisition. Respondents were asked to indicate how lack of access to mobile phones would affect them in terms of knowledge acquisition if they were unable to access mobile phones. Eighteen (8.8%) respondents out of all the telecentres responded to this question. All 18 respondents were excited about knowing how to use the different functions in the mobile phones. Some said that they see a mobile phone as a 'micro computer' and it was easy for them to learn later how to use computers, because the principles were the same.

5.6.7 Impact of the use of the telephone on financial capital

In questions 7.3.1 and 7.3.2, respondents were asked to indicate how their investment in the use of mobile phones had been helpful in economic activities. Respondents were asked to indicate how their economic activities would be affected if they were unable to access mobile phones any more. Forty-three (21.2%) respondents in all the telecentres responded to this question. According to them, the mobile phone was mainly used to communicate with customers and without the phone they would lose customers and business would suffer.

Other respondents said the mobile phone was used to communicate with suppliers. Before travelling to fetch supplies for their businesses they normally called the suppliers to confirm the availability of the things they wanted to buy. Without a phone they would have to travel frequently and perhaps unnecessarily and the cost of doing business would increase. For farmers, the phone is used to enquire about the prices of their products on different markets. Farmers of perishable agricultural products, such as fruit and vegetables said they normally communicated with the customers when their produces are ready and they cannot do that business without the mobile phone.

5.6.8 Impact of the use of the telephone on social capital

In questions 7.4.1 and 7.4.2, respondents were asked to indicate how their investment in the use of the mobile phones had been helpful in social communication. Respondents were asked

to indicate how lack of access to mobile phones would affect them socially if they were unable to access mobile phones. Sixty-three (31%) respondents in all the telecentres responded to this question. Social communication was recorded as the main reason for people using mobile phones.

The respondents said that the phones helped them in terms of social communication. They helped them to stay in touch with their friends and family. Others said that with the phones they had fast and easy communication with friends and relatives. Respondents said that without the phones they would have to travel to different places to see relatives, even about very small things, which could otherwise be communicated over the phone. Therefore, without the phone it would cost them heavily in terms of travelling. Besides, much time and energy would be wasted during travelling.

Focus group discussions revealed more links between the use of the telephone and social capital. Respondents were asked to indicate the effect that the use of mobile phones had on social capital. Different answers were provided by the respondents. Access to a mobile phone had helped one respondent travel from Bubinza (the village) in the Magu district to Dar-es-salaam. He had not known the place but he communicated with his relatives in Dar-es-salaam who gave him directions. “Without a mobile phone I would not have been able to travel to Dar es Salaam”, said the respondent. Another respondent said that the use of mobile phones has increased the integration between the people living in rural areas and their relatives living in urban areas and has improved the social capital between the two groups.

5.6.9 Impact of the use of ICTs on the vulnerability context

The potential impact of telephony on vulnerability lies in people’s ability to obtain information and respond quickly and effectively to shocks, among other things than was previously the case. The respondents acknowledge the beneficial impact of telephony on the ability to deal with family emergencies. This was mainly associated with health issues injury and death, of a close relative. They said in case of such events they are able to call other relatives who are living far away, for help and financial assistance. In Magu, respondents said with the mobile phone they are able to call taxi services in case of an emergency or in case of sickness, a reaction which was not possible in the past. The analysis of the communities in relation to their vulnerability context revealed that the communities were vulnerable to family

emergencies, extreme weather conditions and seasonal variation in the prices and availability of food stuffs. This information was obtained through probing and asking the respondents follow up questions.

5.7 Barriers to effective utilisation of ICTs

This objective sought to identify barriers that respondents faced with regard to the use of ICTs. Respondents were required to name barriers that they faced with regard to the use of telephones, barriers that they face with regard to the use of the internet and other services provided by the telecentre. Results for this research question came from individual interviews with respondents and from focus group discussions.

5.7.1 Barriers to the use of internet and other services provided by the telecentre

Questions 6.7.1 to 6.7.6 asked about barriers that respondents face with regard to the use of the internet and other services provided by the telecentre. The answers are given below:

- The high cost of computer training programmes was indicated as one reason why some people do not attend such training;
- For the majority of people the telecentres are located very far from where they live. The distance from the telecentre represents a barrier for effective utilisation of the services offered by the telecentre. In some cases, individuals are forced to travel up to 100 kilometres on bicycles or on foot;
- Lack of time to attend computer training classes at the telecentre and for the use of other services provided by the telecentre. This was especially true for women who have to take care of children. These women said they will only be able to attend computer training classes and make use of other services provided by the telecentre once their children had grown up;
- Lack of understanding of the English language (the language of the computer) was given as one of the reasons why people were not able to use the internet and attend computer training programmes at the telecentre. Respondents said that, because of the language problems, the people who benefit more from the telecentres are the elite and the more educated member of the communities and not farmers, who are the majority.

Focus group discussions revealed more barriers that the respondents experienced in using the internet and other services provided by the telecentres. These were:

- In CROMABU, respondents said the coverage of the service is still very low and needs to be expanded. At the time of this research CROMABU services were only available in three of the 27 wards of the Magu district;
- Another respondent said some members of the community are fearful about using the technology and feel intimidated by it. Respondents said many people still believe it is very expensive to learn how to use the computers and one needs to be highly educated to be able to use computers. This phobia raises an impediment to the broader use of ICTs. The respondents said telecentre staff can help reduce this by being helpful to their customers and help them overcome their technophobia;
- Unreliable internet connection at the telecentre was named as a barrier. The respondent said sometimes the telecentre stays without internet connection for perhaps a month and this discourages users.

5.7.2 Barriers to the use of telephones

Questions 7.6.1 to 7.6.6 sought to identify barriers that respondents face with regard to the use of the telephone. Since the majority of people used mobile phones, most of the barriers were related to mobile phone use and access. Barriers named by the respondents included the following:

- High cost of buying and maintaining mobile phones;
- Difficulties involved in charging the batteries of mobile phones. This was especially serious in places where there was no electricity. One respondent said electricity is like the final door that needs to be opened for mobile phones to be widely used;
- Difficulties with understanding the English language. This was because many mobile phones use English language menus. Operating a handset with English language menus was a barrier to the use of the technology for most of the respondents;
- Another respondent said mobile phones have helped, but only to a lesser extent in the villages, because most people did not know how to use most of the functions in the mobile phones. Many people only knew to make calls. Due to limited knowledge of

using mobile phone, people cannot take advantage of cheaper means of communication, such as short messaging services. Some phone-sharing mechanisms that people use limit the utilisation of the phone to only making calls, which is more expensive;

- Quality of the handsets that people bought is a problem. Most people unwittingly buy fake mobile phone handsets and their accessories. Such phones do not last long and cause losses to the people, especially the poor;
- The respondents said not everybody had access to a mobile phone and even coverage of the GSM networks is not even. There are places in rural areas without the GSM network at all.

5.7.2 Problems and other negative consequences of the ICTs

- Young people imitate things which they get from the internet and which are contrary to the cultural values of their communities;
- Watching pornography on the internet by the youth. The respondents advised the telecentre management to introduce strict disciplinary actions for people involving themselves in such viewing. In Sengerema, one respondent suggested the use of fines for people caught watching pornography at the telecentre;
- Mobile phones have created new problems. Organised crime, car hijacking and passenger bus hijacking have increased with the widespread availability of the mobile phone. In Karagwe the respondents said that police discovered that bandits who hide in the forests always stay near the mobile phone masts, in order to communicate easily.

5.8 Summary of the findings

Some of the major findings of the study are given below. They are grouped according to the objectives of the study.

5.8.1 Current status of ICT sector development in the selected rural areas of Tanzania

- The roads in three of the districts involved in the study were in terrible condition. This make it difficult for farmers to transport their produce to markets outside the districts;

- Majority of the people did not have access to electricity. In all the districts involved in the study, less than 10 percent of the population had access to electricity;
- Basic mobile phone service was available in all the districts, but in some places the network was patchy or non-available;
- None of the telecentres was providing telephone services to the public or selling air-time vouchers. Public telephone services were mainly provided by "Vodacom people's phone services "and other make-shift public phone service providers;
- Air-time vouchers were widely available in almost all local shops, but as ones travels further from the district headquarters into the villages, the prices of air-time vouchers increase by at least 10%;
- In all the districts, telecentres were the only places that provided reliable public access to the internet;
- There was an emerging trend towards providing ISP services to the community by the telecentres, as a way of generating more income for the telecentres;
- Three out of the four districts visited had community radios;
- Community radio contributes to the reporting of local news and to strengthening the social fabric of the communities.

5.8.2 Policies which are available to facilitate development and utilisation of ICTs in the selected rural areas of Tanzania

- There was a gap in ICT policy-making and implementation, because the then Ministry of Infrastructure Development did not play its policy-making function effectively;
- The implementation strategy for the national ICT policy is still in draft form, even though the policy is currently used for planning purposes;
- Infrastructure development and universal access policy are the two policies which the ministry is currently working on;
- All the interviewees were optimistic about the national ICT policy and the role of ICTs in national development.

5.8.3 Access to ICTs by people in the selected rural areas of Tanzania

- The majority of the people were aware of the telecentre and its services;

- Accessing the internet was mentioned as an important reasons why people visited the telecentres;
- The majority of the respondents lacked skills to use computers;
- In all the telecentres email was mainly used to communicate with friends and relatives, as opposed to business or knowledge acquisition;
- For the non-user of the telecentres the barriers for the use of ICTs were the high cost of the services, lack of skills and language problems;
- Mobile phones were the type of telephones used the most;
- The majority of the people had access to mobile phones, either by ownership or borrowing from friends and relatives.

5.8.4 Usage patterns of ICTs by people in the selected rural areas of Tanzania

- Business and agricultural related information were the main information needs of the people in the communities visited;
- Most of the information needs of the respondents were related to personal existence, survival, development and informal sector activities, as opposed to information needs related to formal work situations;
- Face-to-face communication and the radio were the major sources of information that the respondents used;
- The internet was mainly used for web-based email accounts and pornography related websites.

5.8.5 Impact of the use of ICTs on various aspects of the livelihoods of the people living in the selected rural areas of Tanzania

Some of the major findings under this research question include the following:

5.8.5.1 ICTs and social capital: internet and other services offered by telecentres

- Email was the primary reason for using the internet;
- Email was mainly used for social communication with friends and relatives living in urban area and outside the country;
- The telecentres provided a space/venue where people could meet and exchange ideas, information and knowledge;
- Strong social capital is important for the community and ICTs are helping to strengthen it;

- Some telecentres organised community members into groups and provided a space where these groups meet;
- Social capital from groups provided a means for members to share problems and live together;
- In two districts such groups were operating as a Savings and Credit Co-operative Society (SACCOS);
- The Savings and Credit Co-operative Societies mobilise savings from members in order to create a pool of funds from which they access loans at fair and reasonable rates of interest.

5.8.5.2 Community radio and social capital

- The community used the radio to communicate and pass messages in cases of death, sickness and various events happening in the society;
- They were able to report missing children and missing livestock;
- They could send greetings to one another, thereby strengthening the social fabric of the society.

5.8.5.3 Mobile phones and social capital

- Mobile phones were mainly used for social communication;
- Respondents said without mobile phones they would have to travel to different places to see relatives more often, which is expensive;
- Mobile phones reduce travelling expenses;
- Relations between people living in rural areas and their relatives living in urban areas have improved because of the mobile phones;
- The improved relations are important for rural people in terms of remittances from migrant family members and help in times of need.

5.8.5.4 ICTs and human capital: internet and other services offered by telecentres

- The majority of the respondents said they rarely use the internet for knowledge acquisition;
- Respondents indicated that they use the internet to access information about education and opportunities for further study;
- Respondents said they could easily access exam results for secondary school students using the internet services provided by the telecentre. This made it easy to follow up further education opportunities and reduce unnecessary delays;

- Some telecentres organised seminars, in partnership with other NGOs, which gave people opportunities to learn new ideas;
- The internet provided access to news: two remote districts (Ngara and Karagwe) receive newspapers only twice a week and people rely on the community radio or expensive satellite television for news;
- Computer training gave people skills which provided employment for some and improved work efficiency for others;
- For business people, computer knowledge was found to have made their businesses more efficient. For instance, the ability to use word processing and spread sheet programs enabled them to keep their business records easily and neatly.

5.8.5.5 Mobile phones and human capital

- Respondents were excited with their knowledge of using the mobile phone. To many people this was like a small computer that they had access to;
- Many started using mobile phones and later learned to use computers. They said it was easy that way because the principles were the same.

5.8.5.6 Community radio and human capital

- The community radio broadcast local news and information;
- One respondent said it acts like a 'talking drum' for the community;
- Very few educational programmes on community radio due to staff and expertise limitations.

5.8.5.7 ICTs and financial capital: internet and other services offered by telecentres

- Marketing and price information provided by telecentres enabled farmers to earn fair prices for their products;
- The pricing information empowered them and gave them more bargaining power over the business middle men;
- The information on the price of produce was collected weekly from various markets by volunteers, processed at the telecentre and then disseminated to farmers, such as by being posted in public places or read in farmers' groups;

- In the groups sometimes the information is read in local languages;
- Respondents who own computer and ICT related businesses use the internet for down-loading software and antivirus programs;
- Respondents working with NGOs use the internet to communicate and stay in touch with their sponsors;
- The internet helped people who were looking for employment opportunities. Various job opportunities and applications for tenders are advertised on the internet;
- The community radio was used for local business advertising;
- Computer training provided by the telecentre enabled some to get jobs in NGOs, companies or secretarial service shops;
- Computer training created self-employment;
- One respondent pursued a career in telemedicine after being trained by the telecentre and is still using the telecentre facility to offer telemedicine services to the community;
- A few started secretarial bureau businesses after being trained at the telecentre.

5.8.5.8 Mobile phones and financial capital

- Mobile phones created employment and entrepreneurship opportunities;
- Business people use the mobile phone to communicate with suppliers and customers;
- Mobile phones helped people in business to check the availability of supplies before travelling;
- Respondents said without the phone they would have to travel frequently and the cost of doing business will increase and they may lose customers;
- For farmers the phone is used to enquire about the prices of their products on different markets, e.g. farmers of perishable agricultural products said they normally communicate with customers when their produce is ready and they cannot do that business without a phone;

5.8.5.9 ICTs and diverse livelihoods strategies

- Information provided by the telecentre enabled some farmers to try out new livelihood strategies and adopt them in combination with the existing ones;

- In one district a group of women learned how to cultivate mushrooms and more productive ways of raising indigenous chickens;
- This information complemented their traditional livelihoods strategies that mainly relied on cultivation of cotton as the sole cash crop;
- In other districts the cultivation of highly valued agricultural products such as spices, vanilla, fruit and vegetables dove-tail with the traditional livelihoods strategies that mainly relay on traditional cash crops such as coffee and cotton.

5.8.5.10 ICTs and the vulnerability context

- The respondents acknowledged the beneficial impact of the mobile phone in the ability to deal with family emergencies;
- This was mainly associated with health issues, injury and death of a close relative;
- The respondents said in cases of emergencies they are able to call other relatives who are living far away for help and financial assistance;
- In one district, respondents indicated that they used the mobile phone to call a taxi or a person with a bicycle in case of emergency or if someone is sick and needs to be taken to the hospital. This was not possible in the past.

5.8.6 Barriers to the use of internet and other services provided by the telecentre

- Affordability, computer illiteracy, distance to the telecentre and language were mentioned as the barriers that hinder effective utilisation of the telecentre services;
- In the case of mobile phones**,** the high cost of buying and maintaining mobile phones, difficulties involved in charging mobile phones batteries once they are discharged and language barriers were mentioned as barriers that hinder effective use of this technology;
- Lack of skills to use ICTs such as computers and mobile phones. SMS is considered a cheap means of using mobile phones but it is not used much due to lack of skills and the literacy required;
- Poor transport and communication infrastructure. Farmers still have many other limitations on top of lack of information. For instance, farmers were provided with

information on markets but could not make full use of the information due to the lack of transport facilities and inability to produce in large quantities;

- Lack of electricity and frequent power cuts. This causes interruptions in the radio programmes and other telecentre services;
- The respondents pointed out that ICTs have created new problems such as easy access to pornography which is considered immoral and against the "Tanzanian culture". Increased access to mobile phones has resulted in higher rates of organised crime;
- Sustainability of telecentres is still an issue.

5.9 Summary

Chapter Five presented and analysed data, in accordance with the research objectives and research questions. It has provided a summary of the research findings and formed the basis for the data interpretation presented in Chapter Six.

The key themes which emerged from data presented show that, although there is some development in the development of the ICT sector in rural areas of Tanzania, significant barriers for effective utilisation of ICTs for sustainable livelihoods still exist. This is especially true in terms of lack of an adequate transportation infrastructure and under-developed electricity supply systems. The national ICT policy landscape shows that the existing national ICT policy and regulatory framework is not effective and requires improvement and that the situation undermined effective utilisation of ICTs for sustainable livelihoods in rural areas.

In terms of access to ICTs, the results show that respondents were provided with physical access to ICTs, however, the necessary conditions for real access to ICT were still lacking, especially in terms of skills to use the technology, language and affordability. The situation affects effective utilisation of ICTs for sustainable livelihoods in rural areas. Another theme that emerges from the data is the fact that telecentres lack knowledge on the information needs of the communities they serve. They are thus not providing the required information.

Concerning the impact of ICTs on livelihoods, the themes that emerge include the fact that ICTs are making some contribution to the various aspects of livelihoods of people living in rural areas. In human capital the technologies lead to ICTs literacy, improved farming techniques and better access to information concerning new cash crops. In the social capital, ICTs help in community interaction and knowledge-sharing, better follow- up for remittances and creation of savings and credit co-operative societies. In the financial capital ICTs lead to better earnings and savings. ICTs also help farmers diversify their livelihoods strategies and their sources of income. The next chapter discuses the results and provides their interpretation.

CHAPTER SIX

DATA INTERPRETATION AND DISCUSSION

6.0 Introduction

Chapter Six provides an interpretation of data presented in Chapter Five. Neuman (2006: 473) pointed out that the discussion chapter should be separated from the results, so that readers can examine the data and arrive at their own conclusions. It is only through interpretation that the researcher can expose relations and processes that underlie the findings (Kothari 2004: 344). Interpretation involves searching for the broader meaning of the research findings, as well as relating the findings to the literature reviewed and the objectives of the study. The interpretation involved relating the findings to the current theories and finding out whether or not they are consistent with them.

The general purpose of this study was to investigate how, and for what purposes, ICTs are used by people in selected rural areas of Tanzania and study the impact that ICTs have on the various aspects of their livelihoods. The specific objectives of the study were:

1. To establish the current status of ICT sector development in the selected rural areas of Tanzania.
2. To determine policies which are in place to facilitate development and utilisation of ICTs in the selected rural areas of Tanzania.
3. To examine the extent to which people in the selected rural areas of Tanzania have access to ICTs.
4. To examine use patterns of ICTs by people in the selected rural areas of Tanzania.
5. To determine the impact of ICTs use on various aspects of the livelihoods of the people living in the selected rural areas of Tanzania.
6. To identify barriers to effective utilization of ICTs in the selected rural areas of Tanzania.
7. To recommend a model for effective implementation of ICTs and their use for sustainable livelihoods in the selected rural areas of Tanzania.

In Chapter Six the findings are presented according to the themes of the objectives of the study. The discussion will be referring to the findings summarised in section 5.8 and other empirical data illustrations provided in Chapter Five. The chapter begins by discussing the background information of respondents, which was not part of the specific objectives of the study, but relevant for keeping the flow of argument in the thesis. The characteristics of the respondents were presented, to show that the population was appropriate for the study and was likely to give the information required to answer the research questions.

6.1 Characteristics of respondents and the use of internet and other telecentre services

The findings on the characteristics of respondents are provided in section 5.1.2. This subsection discusses the findings on the characteristics of respondents and the implications of the findings on the livelihoods of the rural people involved in this study. Sebusang and Masupe (2002) pointed out that rural communities lack certain necessary skills, technical and otherwise, and are, on average, less formally educated than urban communities. Their characteristics may make them miss out on the empowerment that comes with having information or access to ICTs.

This section will discuss the extent to which characteristics of the respondents involved in this study facilitated or hindered their ability to use ICTs. Etta and Parvyn-Wamahiu (2003) pointed out that users of the telecentre were disadvantaged on the basis of age, gender, education, literacy levels and socioeconomic status. Similar sentiments were raised by a number of authors such as Ojo (2005), Mercer (2005) and Oyelaran-Oyeyinka and Adeya (2004).

6.1.1 Age of the respondents

Age is one of the factors that may influence use or non-use of ICTs. The mean age of respondents in this study was 28 for Sengerema, 29 for Magu, 29 for Karagwe and 28 for Ngara, as shown in Table 5.1.1. When the ages of the respondents were compared with users and non-users of the telecentres it was shown that most users were between the ages of 18 and 35. These findings are similar to the profile of internet users or ICT consumers in most parts of Africa, in terms of age. Etta and Parvyn-Wamahiu (2003) pointed out that in Mali, youth

and adults younger than 40 years of age constituted more than 80% of users. The most active telecentre users were between 17 and 40 years of age.

Etta and Parvyn-Wamahiu (2003) pointed out that in Uganda about 71% of the users were between the ages of 18 and 50 years and close to one-third (27.1%) were younger than 16 years old. In a study conducted at Nakaseke telecentre in Uganda, Ojo (2005) stated that over 80 percent of the users were younger than 35 years old. Over 50 percent of the users were between the age of 15 and 20. Franda (2002: 18) pointed out that the largest number of Africa's 1.5 million internet users were young, between the ages of 25 and 35 years.

In another study done in Tanzania, Mercer (2005: 250) discovered that telecentre and internet cafés were frequented predominantly by young males aged between 15 and 30 years. Users were relatively well educated, with the majority having attended school beyond primary level. In a study that involves internet cafés in Tanzania, Chachage (2001) found that the majority of internet users were aged between 16 and 35 years.

These findings indicate that internet users in Tanzania are generally young and there is an absence of old people in most public internet place such as telecentres and internet cafés.

6.1.2 Gender

Because of the non-probability nature of this study, efforts were made to include both males and females in the study. The overall male:female ratio in this study was 1:1. However, the majority of the users of the internet and other service provided by the telecentre were males. Various studies have highlighted gender differences in the use of ICTs resulting in what can be termed the gender digital divide (Lee 2006: 192; Hafkin and Taggart 2001; Huyer and Sikoska 2003; Roman and Colle 2002).

The gender digital divide describes the disparities that exist between men and women in the use of ICT facilities. It is also observable that the social position of most women in developing countries distances them from information and communication technologies (UNESCO 2003b). A study by Etta and Parvyn-Wamahiu (2003) pointed to the same trend.

Fewer women than men used telecentres in all the countries and facilities visited. In Mali, 77% of the users were men in Mozambique 63% of the users were men and in Senegal 70% of users were men.

A study by Chachage (2001) reveals that there was a higher proportion of male internet users (58 percent) than female (42 percent). Adam and Green (1998: 94) found that women internet users are generally in the minority. In a study conducted at Nakaseke Multipurpose Community Telecentre, Ojo (2005) found that it is the educated young male who monopolises the use of internet and ICT-based services, with over 70 percent of the users being male. In another study it was found that men accounted for 62 percent of internet users in Tanzania (Mercer 2005: 250). Arun, Heeks, and Morgan (2004) stated that the impact of ICTs in developing countries is not gender neutral, necessitating an engendered approach to ICT-based projects.

The findings of the present study confirm gender divisions in access to ICTs. Female access to ICT is still remarkably low in comparison to male access, because the gender nature of the social, economic, policy and technological systems that frame opportunities for women is not being taken into consideration in most ICT initiatives (Robins 2002).

Some of the reasons for women's exclusion or the gender digital divide are illiteracy, poverty, lack of time, insufficient skills and male-dominated corporate control. Roman and Colle (2002) said that there are hundreds of thousands of women all over the world who may be shut out of the information society because of their literacy level and their gender. Most will never open the door of a telecentre or push the start button of a computer. In Tanzania women are about twice as likely as men to have no education and rural women have been particularly affected, with 41% of them being unable to read or write (URT 2001). Such differences in literacy levels between men and women make the situation more severe, especially in the case of women.

6.1.3 Literacy and levels of education of the respondents

As shown in Table 5.1, literacy levels in terms of the ability of the respondents to read and write in the national language (Swahili) was quite high at all the sites. However, when differences in educational levels were compared with computer and internet use, those with higher levels of education were the more frequent users of the computer and the internet than those with lower levels of education.

A study by Jensen (2000) revealed that 87% of Zambia and 98% of Ethiopian internet users had a university degree. In Tanzania, Mercer (2005: 250) discovered that 51% of internet users in Dar es Salaam and 28% of users in Sengerema had all completed secondary education, while the national figures for this category is just five percent of the population. A study by Franda (2002: 18) found that, on average, the internet user is male, 35 years old or younger, college-educated and English-speaking.

Education is also necessary in the acquiring of skills associated with the use of various ICTs and those with higher levels of education are more likely to have better skills than those who do not have. Literacy is considered an important element to enable people to use ICTs. Roman and Colle (2002) said no matter how "wired" a country becomes, without basic literacy the major benefits of ICTs will be lost. Without education many people will not be able to use ICTs such as computers, not because they do not have physical access to a computer but because they cannot read what is on the screen.

In the case of Tanzania, about a quarter of Tanzanian adults have no formal education and 29% can neither read nor write (URT 2001). In rural areas, 30% of the population has no formal education. Very few adults in rural areas have been educated beyond primary school level (URT 2001). Telecentre staff can overcome this barrier brought about by differing education levels in the use of ICTs, which excludes the majority in rural and disadvantages communities, by initiating localised training that targets disadvantaged groups like women as was done in the telecentres involved in this study. All telecentres visited had computer training classes where various groups of people in rural area are given an opportunity to learn

how to use computers and the internet. These included women, young girls, elderly and youth in general.

6.1.4 Occupation of the respondents

As explained in section 4.6.3, the occupation of the respondents or the economic activities that they perform formed the strata which were used for sampling purposes in this study. Most of these activities were performed on a small-scale and they constituted what is generally termed the micro-enterprise or the informal sector.

Table 5.1.3 shows the occupation of the respondents involved in this study. When the various categories of occupation of the respondents are grouped in terms of formal versus informal economic activities, the results are as shown in Table 5.1.4 in Chapter Five. The majority of the respondents involved in this study came from the informal sector. In terms of ICT use respondents from the formal sector were all users of the ICTs, including the internet, mobile phones and other services provided by the telecentre. All the non-users of ICTs came from the respondents engaged in informal sector activities.

Although respondents involved in the informal sector represent the majority of people in the research areas, the majority of the ICT users were the respondents employed in the formal sector and students. Similar trend was pointed out by other studies. Mercer (2005) found out that secondary school students were the largest single user group of telecentres and internet cafés. Mercer (2005) discovered that those who did not use the internet café tended to be engaged in informal, low-paid economic activities. Farmers, and those in the informal sector, both of whom are considered 'target user groups' by the telecentre, are significantly under-represented among telecentre users. In another study Chachage (2001) pointed out that the most numerous group of internet users were students, who made up 55 percent of the total population. The next group was people, employed full-time in the formal sector. This group accounted for 27 percent of the total response.

Within the informal sector category differences in the use of ICTs exists. Esselaar *et al.* (2007) stated that owners of informal businesses were, on average, less educated than owners

of semi-formal businesses and this affected their use of ICTs. This was mainly due to lack of knowledge of how to use computers and accounting packages that prevented many informal business operators from using ICTs.

6.1.5 Characteristics of respondents and the use of mobile phones

With regard to mobile phone services, this study shows that there was not much difference across gender in terms of access and use of mobile phones. Similar findings have been reported by Castells *et al.* (2006), Samuel, Shah and Hadingham (2005), Sinha (2005) and Souter *et al.* (2005). In most cases, men tend to be owners of mobile phone devices and women mainly accessed the technology through borrowing and other sharing mechanisms. The results concur with Coyle (2005) and Sinha (2005), who said that people at all income levels are able to access mobile services, either through owning or sharing a phone. Gender, age and education do not seem to constitute barriers to access. While income certainly explains the level of usage, lack of income does not prevent the use of mobile phones.

Coyle (2005) suggested that mobile phones seem to be a good example of a technology that permits leapfrogging of an older infrastructure. Coyle (2005) said that, in contrast to the diversity of patterns between countries, mobile use within any given country is characterised by greater uniformity than other ICTs across, for example, socio-economic groups or gender. The implication of this is that the digital divide could be smaller in the case of mobile phones, compared with other ICTs.

6.2 Research question I: Current status of ICT sector development in the selected rural areas of Tanzania.

The research findings in regard to this objective presented the ICT landscape in the researched rural areas as it was during the time of the research. The objective is mainly concerned with the physical presence of these technologies. However, the researcher acknowledges that physical access to ICTs alone is not enough to ensure that the technologies are used and making a difference in people lives. Other factors that affect access and use of these technologies will be discussed in the next sections. The information provided in the discussion of this objective aim at providing feedback to policy and decision-makers in the

ICT sector. The discussion may serve as the basis for a more detailed analysis of the ICT sector development, especially in rural areas of Tanzania.

The following section provides an analysis of the current status of the ICT sector development in the researched rural areas (the four districts). Various aspects of the ICT sector and ICT-related infrastructure covered under this objective are explained in section 5.2 of Chapter Five. The analysis of other sectors which are necessary for effective functioning of the ICT sector is presented. In the case of Tanzania, lack of access to ICTs is not the only problems that rural areas are facing. Rural areas lack access to many other things and they are faced with challenges such as a lack of access to other technologies, lack of access to fully-diffused grid electricity, poor road infrastructure and an inefficient transportation system. Even though the current emphasis is on the 'new' ICTs such as computers, internet and mobile phones, most rural areas still have no access to even the 'old' ICTs such as television and radio.

6.2.1 Condition of roads and transportation system

Transport and communications infrastructure is necessary for socio-economic development, because it provides essential links between centres of production and markets in economic sectors such as agriculture, industry, mining, and tourism (WBCSD 2007). The road network is either poor or non-existent in most rural areas of Tanzania. Transport and communication between most of the rural areas are extremely bad. It is difficult for crops and other items to cross regional or even district borders. A report by WBCSD (2007) said that in rural areas of Tanzania, walking and head-loading dominate travel and transport activities and, in most cases, the movements take place on footpaths, tracks and trails away from the formal road network. The availability of buses, tractors, pick-ups and trucks is very low. Rural households use other non-motorised transport such as bicycles, animal-drawn carts and wheelbarrows to transport agricultural inputs and outputs from their fields.

Transport is a key infrastructure sector that acts as a stimulus to economic growth and is an important element of strategies for poverty reduction and regional and national development. Improvements in the transport infrastructure would reduce transport costs and make the goods consumed by the poor in the country more affordable and their produce more competitive

(WBCSD 2007). Without efficient road infrastructure and transport system farmers will not be able to take their produce to markets, even if they are provided with the information about better prices of their produce in some markets outside their localities.

Most of the areas visited were remotely located and had very poor roads and transportation facilities. WBCSD (2007) pointed out that remoteness is one of the key factors in explaining the high levels of poverty in Tanzania, as it limits access to markets, increases prices of inputs and makes both economic and social services less accessible. ICT sector development in these areas should go hand-in-hand with the development of the road infrastructure and transportation systems. This will help to facilitate easy movement of people and goods and open up the remote and isolated rural areas to business and other economic opportunities. There should be a link between different types of infrastructure development such as roads, electricity and ICTs infrastructure.

6.2.2 Electricity supply

Electricity supply is an important requirement as a source of power for the ICTs. Electricity is required to run computers, to charge mobile phone batteries, as a source of power to VSAT systems in telecentres and as a source of power for community radio stations. Without electricity supply from the grid, solar or any other alternative source of electricity it is very difficult to deploy and sustain meaningful ICT projects. In terms of electricity supply many developing countries, including Tanzania, are characterised by unstable power supply systems, with frequent power failures in cities and a total lack of power supply in rural areas. Afemann (2000) said 70 % of all Africans live in rural areas without any power supply. Barnes (1997) stressed that electricity is a prerequisite for access to global communications networks. However, nearly two billion people in rural areas, still have no access to electricity.

In most rural areas, electricity is the first major obstacle that needs to be removed to facilitate widespread adoption or utilisation of ICTs. Electricity is much more important for the development of computer and internet related ICT services. A report by InfoDev (2008) said:

> Electricity is extremely relevant for wider internet development, while telephone networks and their use has not been stopped by the lack of electricity

(though lack of electricity has increased cost and slowed speed of network development), further internet development and geographical spread will depend highly on increasing electrification as a pre-condition.

In all the districts visited, merely 10% of the population had access to electricity and the rest of the population had not. Alternative sources of power, such as solar power or thermal powered generators, could only be afforded by a few people in these areas. Lack of electricity supply poses a big challenge to ICTs universal access policies in many developing countries. InfoDev (2008) warned that lack of electricity supply raises telecommunications network costs significantly and funding universal access to ICTs initiatives in areas without electricity supply represents an additional burden on the budget. McNamara (2008) stated that inadequate infrastructure, such as road, electricity and landline telephones, is the main impediment towards ICT-for-livelihood interventions in Tanzania.

Mobile phone technology seems to cope with the challenge of electricity much better than other computer-related ICTs. Mobile phone operators install their base stations (masts) with their own diesel-powered generators and users struggle to keep their mobile phone batteries charged by using car batteries or taking phones to nearby towns for recharging. This phenomenon was common in all the four rural districts studied.

6.2.3 Telephone services

Although the fixed-line telephone industry was opened up for competition in Tanzania in the year 2004, much of it is still operated/dominated by the incumbent telecommunication operator TTCL. This is especially the case in rural areas. It is difficult and expensive to deploy nation-wide infrastructure for fixed-line phones. Because of these limitations coverage of this kind of telephone is very low in rural areas and in all the research areas visited. In the Tanzanian context, landline (fixed-line) telephones are present only in major provincial and district towns and are totally absent in the villages (Cook 2005).

In Tanzania, a fixed-line telephone service is considerably cheaper than mobile phones and now significantly cheaper than it was before the mobile phone operators began providing the

service. However, it is reportedly less reliable and more expensive especially in dialling networks other than the TTCL-owned (Cook 2005). For these reasons, mobile phone use dominates the rural areas. In many developing countries, the growth of the mobile phone industry is rapidly out-pacing the development of fixed landlines. In Tanzania, in 1995, 98% of telephone usage was through landlines. By the year 2000, the percentage had dropped to 58% and in year 2006 it was a mere 4%. The reverse applies to mobile phones where their usage was 2% in the year 1995, 42% in year 2000 and 96% in the year 2006 (WBCSD 2007). This trend is mainly attributed to the prevailing competition between the incumbent telecommunication operator and mobile phone service operators.

Mobile phone networks in the rural areas of Tanzania are a fairly recent development, driven primarily by the inability of fixed-lines providers to meet the demand, as well as changes in telecommunication policy, which facilitated the growth of private telephone companies across the country. In terms of mobile phones, it seems that the overall penetration of these services is relatively good. As revealed by many studies, mobile phones are substituting the fixed ones in many parts of Africa and are meeting the growing demand that fixed landline providers could not fulfil. However, it is faced by not only the scarcity of necessary infrastructure which makes it too expensive to deploy in rural areas, but also challenged by the difficult terrain and topography which exacerbates maintenance and opportunity costs (WBCSD 2007).

In some rural areas where mobile phone services have been deployed, the quality of such services is normally low and characterised by patchy reception and weak signals.

6.2.4 Television

While radio and television are considered to be old ICTs, unfortunately these technologies are still not yet fully accessible in rural areas. One of the districts reviewed in this study had no access to the terrestrial television signal from Tanzania television broadcasters. This compelled people in this area to incur much extra expense in the deployment of satellite television.

According to Isamuyo (2006), approximately 90 percent of the television broadcasting services in Tanzania are only available in big cities. People in small towns have to use expensive satellite dishes to receive television signals. This prevents a large number of people from accessing the service due to the high initial cost of the satellite dishes. A study by Manyele *et al.* (2005) found that television services available in urban areas of Tanzania are not receivable in most rural areas. Accessibility of television services in all the districts visited was very limited and was associated with weak signal or a compete lack of signal. Cook (2005) pointed out that in Tanzania only 5% in the villages have regular access and television was not mentioned as a significant source of information in surveys.

6.2.5 Radio

In all the districts involved in this study radio services were prevalent and radio was identified as the main source of information for the majority of people. Broadcasting from national radio stations was still very important, but it was evident that there was much interest in the upcoming community radio stations. Two of the districts (Sengerema and Ngara) had up-and-running community radio stations. Karagwe had two community radio stations which were in their final stages of going on air and Magu telecentre had a plan to start a community radio station in the future.

In the case of Ngara, the community radio station (Radio Kwizera) was a very important source of information for the community, since the terrestrial signal from other radio stations could not be accessed from Ngara. For the people of Ngara Radio Kwizera was the only readily accessible radio station they had. The importance of community radio stations and their role in broadcasting local news and information has been acknowledged by a number of authors (Lourenço 2003; Nguo *et al.,* 2005; Tabing 2002; UNESCO 2004).

Kaul (2007) stressed that community radio can give a voice to the voiceless; challenge and, eventually, provide a viable alternative to mainstream media's monopolistic and trivial interpretation of news. The need for community radio is necessitated by the need for communities to create their own content and air their concerns. This is important because the programmes on existing mainstream media based in urban centres and big cities appear

irrelevant to them. Furthermore, the radio is cheaper than other ICTs and is audio-based, hence relevant even to people who are illiterate.

For the majority of people living in rural areas, radio is the only electronic gadget they can afford. Kaul (2007) stated that the most empowering aspect of community radio is that it promises to nurture an alternative media - a media not controlled by large business houses or multinational companies, but by slum-dwellers, craftspeople and folk singers. Community radio differs from national or international radio broadcasters because they feature local news and issues and often include local people in the programmes. Community radio may be a useful source of information for the community when it is converged with modern ICT such as the internet through the so-called "radio browsing" programmes. In radio browsing programmes the presenter browses the internet in response to listeners' questions, describes in local languages the websites selected and discusses their contents with a local expert. In this way, the entire community has access to online information in their own language, explained and contextualised.

Another well-established community radio station in Tanzania is the Orkonerei community radio in the village of Terrat, in the rural areas of Arusha. The village has no grid electricity or telephone lines. The radio is famously known as the voice of livestock-keepers and mainly caters for the pastoralist community in Arusha. Orkonerei community radio provides a unique opportunity to empower the pastoral Maasai community faced with severe land alienation, to advocate for the protection and preservation of pastoralism and to share experiences with other marginalised groups across the region (Wanyeki 2002). Orkonerei community radio has a small support office in Arusha, which finds news and information on the internet and sends it to Orkonerei by email, using a high frequency radio, and ‘Bushlink’ software (Practical Action 2003). In addition Kilosa Multipurpose Community Telecentre has a well-established community radio.

6.2.6 Internet services and other telecentre-based services

The status of the internet services and other telecentre-based services in all the four telecentres involved in this study was described in details in section 5.2.1.4, 5.2.2.5, 5.2.3.5 and 5.2.4.5. This discussion is not repeated here so as to avoid duplication.

6.3 Research question II: Policies which are in place to facilitate development and utilisation of ICTs in the selected rural areas of Tanzania

The discussion on policies which are in place to facilitate development and utilisation of ICTs in the selected rural areas of Tanzania will look at the relationship between the various players in the ICT sector and the effect of these relationships on policy-formulation and implementation in the ICT sector.

6.3.1 Policy-making functions compared with regulation functions in the ICT sector

As at the time of this research, rural ICT provision in Tanzania had been accorded a piecemeal and development project based approach. Rural ICT provision is mainly done by small-scale, and in most cases isolated, projects. Different institutions and NGOs, with the assistance of donors, have been starting ICT projects and telecentres in different parts of the country. The same phenomenon was described by Mercer (2005). Because of this kind of approach, the diffusion of ICTs in rural areas has been uneven, with some rural areas completely left behind.

Lack of clear roles and, at times, conflict of interests among the various players in the ICT sector complicate ICT development in rural areas of Tanzania. This was evident during interviews with officers from the then MoID, TCRA and COSTECH. While respondents from COSTECH and TRCA complained about the lack of proper leadership and policy directives from the ministry, the ministry also complained of interference of its activities by the two institutions.

Various authors have made the same observation. Sedoyeka and Hunaiti (2008) revealed various weaknesses in Tanzanian policy-making in the ICT sector. These include the lack of proper policy directives and implementation plans on infrastructure and wider accessibility of

ICTs. The authors stated that "going back to 1974, when all imports of television sets and computers were prohibited, the government has not shown any major effort to correct its previous mistakes". Gorp and Maitland (2007) cautioned that while the MoID and its minister have a role in developing policy and approving regulations, realistically, MoID, due to its small number of employees, does not have a strong influence on ICT and telecommunications policy or regulation.

This means that there is a relative lack of involvement by the Ministry in telecommunications. This scenario affects the overall development of the sector, which so far has been characterised by delayed implementation of important policy objectives such as the universal access policy.

In order to ensure a healthy development of the ICT sector in Tanzania, roles and responsibilities of various institutions need to be clearly defined and observed. Some of these players include the ministry responsible for ICTs. In this case, it was the then MoID, the regulatory authority which is TCRA, research institutions such as COSTECH and education institutions such as the University of Dar es Salaam computer centre. While TCRA implements regulation, the MoID is responsible for the overarching policy making and initiating legislation. Capacity-building and enhancement of the administrative capabilities within both regulator and policy-maker is important for positive development of the sector.

The primary role of the government ministry responsible for ICTs such as the then MoID, is policy-making and development. The role of the regulatory authority is to implement the government policy in an impartial and objective manner to facilitate competition and level the ground for the various stakeholders in the ICT industry (Intven and Tetrault 2002; Gorp and Maitland 2007).

Melody (1997b: 21) views the function of a telecommunication or ICT regulator as follows:

> [the regulators'] task is to implement government policy, ensure performance accountability by the public telecommunication operator and other players to economic and social policy objectives, resolve disputes between competitors

and between consumers and operators, monitor changing industry conditions, and advice government on developments- bearing policy.

Tensions between regulatory agencies and the ministries responsible for communication in Africa are not uncommon. In South Africa, Gillwald (2005b) reported on the problems created by co-jurisdiction between the Ministry of Communications and the regulator on key licensing and regulatory issues. Gillwald (2005b) warned that the overlap between the two institutions created a structural conflict of interests for the Ministry and has been a major point of tension within the sector. The point which is being made here is that both the regulator and the ministries responsible for ICTs need to work together to reduce the tensions between the two institutions. The tensions sometimes impact the sector negatively.

6.3.2 Quality of service regulation

In the recent past, TCRA has had great success in its operations, which resulted in the agency's 2005 recognition as the best regulator in Africa, based on implementation of a fully converged technology, neutral services and licensing framework. TCRA was declared best African ICT regulator during the ICT Africa Investment Summit, which was held in Kigali, Rwanda, in May 2006 (Gorp and Maitland 2007; Mireny 2006). In spite of these achievements, the findings of this study indicate that the regulator is still facing many challenges. The sudden increase in operators who have entered the market as a result of the implementation of converged licensing frameworks and the mobile phone success story have posed new challenges, especially in relation to increased amount of frequency spectrum usage. Challenges such as rural ICT accessibility, high cost of service and quality of service in relation to mobile phone services have not been fully addressed.

Gorp and Maitland (2007) stated that as far as telephone services are concerned, the extent to which Tanzania's population (especially in rural areas) is covered remains unclear. While most of operators have regional and district coverage in terms of points of presence, this does not indicate how deep they go from there to different villages. Various authors have observed that the development of the ICT sector in Tanzania has mainly been urban (Mercer 2005).

The present study shows that there were widespread concerns about the poor quality of service, especially in relation to mobile phones. Respondents complained about poor coverage, dropped calls and in some cases, a complete unavailability of the network. Sutherland (2007) stated that mobile phone users only discover the efficiency of the mobile network after purchasing the service and it may be difficult to change to another operator. Due to this asymmetry in information, the regulators or their consumer consultative committee need to inform customers of their rights and take actions against the operators, to ensure that they provide quality service to their customers. The poor quality of mobile phone service in rural areas has caused inconvenience, especially for those relying on the networks for business or emergency communications.

The problem of the poor quality of services in Tanzania is aggravated by the fact that the first few years of telecom regulation have been used primarily to create a market-based competition environment. Concerns about consumer issues have been a relatively recent development. In handling consumers' issues and quality of service Kerretts-Makau (2007) advised that regulators in Africa need to get past the challenges of cultural apathy towards complaining or voicing opinions, which is attributed to high tolerance levels as a cultural aspect evidenced in many African countries including Tanzania.

6.3.3 Universal access policy

Not much can be said about the Tanzanian universal access policy, because by the time of this research its implementation was at a very early stage. The universal access fund had been established through an Act of parliament. The challenge for the regulator and the new body which will be established to manage the fund will be to ensure that it is operated efficiently and the goal of providing ICT service in the rural areas is met. Lesame (2005c: 219) stressed that universal access policy, particularly the financial dimension, should be neutral to competition and should be transparent. It has to ensure efficiency of the providers of the universal access. It should also clearly define and declare the cost of the universal service scheme and coincide with world trends. Bohlin *et al.* (2000: 81) emphasised that the financial

scheme of the universal access fund should be transparent in management, distribution of funds and share of burden.

6.3.4 ICT policy and its implementation

Discussion on the ICT policy and its implementation is covered in section 2.3.2 of Chapter Two and section 5.3.5 of Chapter Five. This discussion is not repeated here so as to avoid duplication.

6.4 Research question III: Access to ICTs by people in the selected rural areas of Tanzania

Physical access to ICTs is the primary requirement in enabling people to use ICTs. The availability of the technologies is an important incentive in attracting users to take a step further and use the technologies for their benefit. According to the present research findings, people in the four districts had physical access to ICTs, in the sense that there was the availability of the telecentre and mobile phone services. However, while access to physical resources is a crucial aspect of access, it is not, on its own, a sufficient condition for meaningful access. Physical access is merely the first level of access. Physical access can mean availability of different things such as facilities that store, service or carry information and the actual physical devices that people operate, as in the case of the mobile phone network infrastructure and the mobile phone (Clement and Shade 2000). It can also mean computers and connection (Bridges.org 2003).

6.4.1 Access to telecentre services

In light of the literature presented above and in section 5.4, the researcher started dealing with the issue of access to ICT, by asking the respondents whether or not they were aware of the availability of ICT services in their community. In this case the respondents were asked if they were aware of the existence of the telecentre and its services (section 5.4.1). Awareness was relatively high in three areas (Sengerema, CROMABU and FADECO) but not in Ngara telecentre, where almost 50% of the respondents were not aware of the existence of either the telecentre or its service.

Various studies have addressed the issues of awareness of the telecentre and how important it is to ensure the utilisation of the services provided by the telecentre. Roman and Colle (2002) advised that initiatives targeting participation of the population in the information society should consider planning vigorous campaigns to illustrate the benefits of information as an important resource for daily living. Latchem (2001) stated that much time and effort is needed to build awareness and competence in technology and its educational applications.

In line with the 'thick' conception of ICT access or the 'real' access criteria for ICTs, respondents were asked if they had visited the telecentre or not. A half of those people who were aware visited the telecentres. This indicates that not all those who were aware of the services actually used or visited the telecentre services. Some people were aware, but they were deterred from using the services by various factors such as lack of skills to use computers, affordability and language barriers. These factors are discussed in section 5.7.1 in Chapter Five and section in Chapter Six 6.7.1.1.

The findings indicated that the main reason for visiting the telecentre, as stated by the respondents (refer to section 5.4.2 in Chapter Five), was to access email services. Email was used to communicate with relatives, apply for educational positions and communicate with academic institutions abroad and within the country. This was followed by a group of users who said that they used other services provided by the telecentre, such as price list services in Magu and community radio in Sengerema.

The use of email as the primary reason for accessing the internet or telecentre services in developing countries has been reported by various authors. In Nakaseka telecentre Ojo (2005) discovered that main activity of users was email - both sending and receiving email from relatives and friends abroad. To these users email helped them to maintain ties with diasporic communities. The email activity was used to apply for university admission in the United States of America and other Western countries.

Chachage (2001) found that web-based email proved to be the most popular facility used by the internet users. Etta and Parvyn-Wamahiu (2002: 84) concurred that ICTs were used rather

for "social activities than development-oriented action" very few people use the internet for development-related activities such as e-commerce, academic research or searching information for agricultural improvement. This scenario raises scepticism concerning the ability of ICTs to narrow the digital divide and empower communities socially, economically or intellectually (Ojo 2005; Sonaike 2004: 44).

Part of the solution for this problem, as the findings of the present study show (especially in the CROMABU telecentre), is for the telecentres to have creative services which are designed to meet the specific needs of farmers or specific groups of users. In this way, many more people may benefit from the telecentres. Not many farmers can learn to use computers and surf the internet on there own, but when internet use is combined with other simple technologies such as community radio or print media many more farmers will benefit from the services of the telecentre. In CROMABU telecentre, farmers who do not know how to use computers or the internet benefit from these technologies and other telecentre services through their representatives who collect price information from the telecentre and read the information to them in local languages.

For the rest of the telecentres there seemed to be a mismatch between demand for, and supply of, their services. For telecentres to be effective in meeting the information requirements of the communities they serve, the information requirements of these communities need to be established. Thereafter, an effective approach to meeting these requirements has to be devised. Just installing computers with internet connection in a room is not enough to bring about socio- economic development in the communities.

Extending further the concept of real access to ICTs, results in section 5.4.3 show that the majority of the respondents did not know how to use a computer. Lack of skills to use computers or computer illiteracy had been pointed out as the major hindrances towards effective utilisation of ICTs. Latchem (2001) enthused that technology can enhance access, offer faster interaction and provide enriched learning environments, but it cannot empower those who lack the knowledge and skills to exploit it, or guarantee success in learning outcomes. Kaniki (1996) cautioned that it is difficult to find information on the internet, even

for computer-literate users, as information on the internet is not organised logically or indexed systematically. Skills are needed to interrogate the system and to effectively use the information found to meet an information need, assuming that this need has been identified and clearly articulated.

6.4.2 Access to mobile phone services

The same criteria for access were used for mobile phone services. Results in section 5.4.8 show that mobile phone ownership was quite high in all the districts visited. The reason for the high rate of ownership of mobile phones in this study can be explained by the characteristics of the respondents who were involved in the study. Most of the respondents selected were young and economically active. These are more likely to own and use mobile phones. A good number of people have access to mobile phones through borrowing from friends and other sharing mechanisms that they use to share mobile phones among friends, colleagues and family members.

Mobile phone battery-charging and low network coverage remains the most serious challenges to the users. The quality of mobile phone service in these areas is highly compromised. As with access to telecentres and its services, the necessary conditions for access to mobile phone services existed in all the districts. However, favourable conditions for mobile use were still lacking. This is mainly in terms of mobile phone battery-charging, quality of services of mobile phone networks and the skills to use mobile phones.

6.5 Research question IV: Usage patterns of ICTs by people in the selected rural areas of Tanzania.

The results of this objective are presented in section 5.5. The usage patterns of ICTs by the people in the selected rural areas of Tanzania were assessed using the critical incident technique. In order to understand the usage patterns of ICT by the people in these areas their information needs and information-seeking behaviour were studied. The study investigated websites commonly visited by the users of the telecentre and the way in which access to ICT affects the use of other means of communication.

6.5.1 Information needs assessment

Information needs assessment is critical in the development and running of a relevant information service (Du Preez 2008: 16; Kaniki 1994; Khan and Bawden 2005). Since telecentres are meant to provide development related information to the communities they serve, telecentre managers must be aware of the information needs of the communities so as to be in a better position to meet those needs. The concept of information needs and information-seeking patterns of the telecentre users have not been fully embraced in the designing and management of the telecentre projects. Benjamin (2001b) reported that that one-third of telecentre managers interviewed said they had no knowledge of the needs of its customers, while the other two-thirds said they did not develop services to meet user needs. For telecentres to work they must be linked to the real needs of the communities they serve.

Various investigations have revealed the need for telecentres and other information services to fully understand the information needs of the communities they serve. Jensen and Esterhuysen (2001) stressed that it is important for the telecentre management to know the information needs of the communities they are serving. Ikoja-Odongo and Ocholla (2004) are of the opinion that information systems developed or adopted must meet the needs of the people to be served. Stilwell (2002) felt that the ultimate aim of any library or information service is to meet the needs of its community. According to Kaniki (2001), one of the most difficult, yet necessary activities, in the provision of community information is the assessment of information needs. Kaniki (1994: 53) advises that the information needs assessment has to be done regularly if established information centres (and those to be developed) are to continue to be relevant in any given community.

It is evident from the findings of the present study that the four rural communities involved in this study experienced a variety of information needs, such as that for business information, agriculture information and information related to education. These are discussed in section 6.5.2.

6.5.2 Information needs

The results concerning the information needs, presented in section 5.5.1.1, show that the need for business information was named by the majority of the respondents, 44 (32.1%), as their main need for information. In this case critical instances were related to income, budgeting and financial planning for the future. Respondents needed information that would enable them to be creative and new business ideas. Other critical incidents were related to situations in which they had to seek information on loans and micro credit facilities for expanding and financing businesses. Respondents needed information on how to manage businesses effectively. At all the four research sites the need for business information was much more evident in Sengerema, from where 14 (31%) of all the respondents who needed business information came. This was followed by Magu 11 (25%). The results for Karagwe and Ngara were 10 (22%) and 9 (20.5%), respectively.

Part of the reason for the high demand for this kind of information is the high rate of growth of the informal sector. Due to high unemployment levels, lack of skills for employment in the formal sector, illiteracy and other economic hardships, many people find refuge in the informal sector activities. Informal sector activities mainly include small-scale businesses. Some of the informal sector activities cover those which farmers engage in during off-season periods, when they are not busy with farming activities. In Uganda, the informal sector is considered as the main bulwark against unemployment, destitution and crime (Ikoja-Odongo and Ocholla 2004).

Another reason that may have contributed to the high demand for this kind of information was the circumstances which were prevailing in the area during the data-collection phase of this study. During this time the government had advertised a national-wide micro-credit scheme for people involved in small-scale business. However, the information on how to apply for these kinds of loans, how to get the application forms and how to return them was not well communicated. These comments were made by the respondents interviewed in Sengerema. Many people in the rural areas had great interest in applying for these kinds of loans but they were unaware of the application procedures. Business-related information was not provided by any of the telecentre involved in this research. However, people were anxious to get access

to this kind of information. None of the telecentres had conducted any information needs assessment for their communities.

An additional critical incident that was mentioned by the respondents was related to agriculture, where respondents needed information on how to increase production and manage crop diseases and pests. Respondents needed information on marketing and prices for their produce and information on how to start and finance irrigation schemes. This was demonstrated by 24 (17.5%) of the respondents. In reference to the four research sites, the need for agricultural information was more obvious in Magu, where 12 (50%) of all the respondents who needed agricultural information came from. This was followed by Karagwe 5(21%). The results for Sengerema and Ngara were 4(17%) and 3(13%), respectively. The high demand for agricultural information could be expected, given the fact that agriculture is the main economic activity that people in these rural areas engage in. Only two (CROMABU and FADECO) of the four telecentre visited had programmes which aimed at providing agricultural information to farmers. None of these services was available in Sengerema and Ngara telecentres.

Another critical incident that was mentioned by the respondents related to education. This included information on colleges, how to finance college and university education and how to access examination results. This critical incident was evidenced by 19 (13. 9%) of all the critical incidents recorded. As far as the four research sites were concerned, the need for education-related information was highest in Magu, where 11 (58%) of all the respondents needed education-related information. It was followed by Ngara 4 (21%). The results for Sengerema and Karagwe were 3 (16%) and 1 (5%), respectively. The need for education-related information was mainly revealed by the young people, students and those who are employed in the formal sector who wanted to further their education. Most respondents said that they acquired most of this information by searching the internet. Except for the exam results, where telecentre staff would help people to search and print the results, very little of this kind of information (education-related) was available for those who had no skills in using the internet.

Other incidents were related to career development 11(8%), family/personal problems 10(7.3%), health issues 9(6.6%), NGO activities 6 (4.4%) government-related information 4(3%), and loan and micro-credit facilities 3 (2.2%). The relatively minor incidents were legal information 2 1.5%, information on various artistic activities such as promotion and advertising, sponsorship and marketing 2 (1.5%), information on livestock-keeping 1(0.7%), entertainment 1(0.7%) and research-related information 1(0.7%).

The results presented in section 5.5.1.1 show that most of the information needs that the respondents faced were related to personal existence, survival and development. Needs related to the informal economic activities that people partake in their survival, such as small-scale businesses, were found to be more than the needs related to a formal work situation. A larger fraction of the needs related to agriculture, education, career development and family health issues. This means the telecentres have a unique opportunity to help the communities in these areas to meet their information needs. This can be done by designing information services that target the various economic activities of the people in these communities. Agricultural information needs are significant and many farmers are desperately in need of information.

6.5.3 Inability to articulate information needs

Since the respondents said that they had experienced information needs, they were asked to indicate whether or not they had made any attempt to obtain information to solve the problem or the critical incident that they were facing. Over 106 (93%) indicated that they attempted to seek information. This was out of a total of 114 respondents who said they had experienced the need for information. Only 8 (7%) of the respondents said that they had not sought the information/solutions to their problems or the critical needs that they were facing.

Respondents gave various reasons for not doing anything about their problems. Some said that they did not know whom to ask, whereas others said that they were afraid to ask anyone. In other cases respondents said they were convinced that it was impossible to get such help/information. Farmers in Sengerema said that they knew they should ask extension officers in case of any agriculture-related problems. They lamented that those officers were

always not available to the people. One old woman interviewed in Sengerema described the situation as thus:

> My farm has been infested with some pests but I do not know what to do or who to ask. As a result of the infestation, I will not have any harvest this year and all the work I have done on the farm is wasted.

The respondents who failed to articulate their information needs would fall into Fairer-Wessel's (1990) category of respondents who were not consciously aware of their needs. These respondents can be related to respondents in Stilwell's (2002) study, who experienced a state of lacking information but were unable to motivate themselves to find a solution. They do not have ready access to the information intermediaries who could assist in addressing the lack. Maepa (2000) found that 65% of the respondents could not clearly identify their needs and lacked an understanding that information or knowledge can alleviate some of the problems they were experiencing. Proactive information services by the telecentre are needed to reach out to the people who are not able to express their own information needs.

6.5.4 Sources of information

The present findings show that the two major ways that the respondents used for searching for information were listening and talking to friends, relatives and contacting those who knew or had the information. The other means of accessing information, which was mentioned by the majority of the respondents, was the radio. Respondents relied mostly on the interpersonal, informal and oral means of communication as their main sources of information, possibly because of illiteracy, inappropriateness and the high cost associated with other sources of information. Radio was preferred because of the low cost involved in obtaining and maintaining a radio. Ikoja-Odongo and Ocholla (2004) in Uganda stated that radio broadcasts were used the most as a source of information. Maepa (2000) added that in South Africa radio is more relied upon in the rural areas. In areas without electricity people use the radio to satisfy their communication needs (Oyedemi and Lesame 2005: 91).

The other advantage of the two sources of information is that they provide information in the local language of the respondents. The same idea was also expressed by Maepa (2000). The

language aspect has implication on the language formats of the information provided by the ICTs and the telecentres. These results show the need to combine the new ICTs, such as the internet and computer, with the old ones, such as radio, to meet the information needs of the rural communities. With the advent of community radio, this source of information needs to be capitalised on. Creative ways need to be devised to ensure that it becomes a credible source of information to rural communities. The government needs to invest in the production of creative, educative radio programmes.

A number of other studies have stressed the importance of interpersonal and oral communication as a major source of information, especially for rural people (Ikoja-Odongo and Ocholla 2004; Kaniki 1994: 13; Kiondo 1998; Maepa 2000; Mafu 2004). Stilwell (2002) found that personal sources were favoured information channel even when access to a range of sources is available. Case (2002: 8) stated that, despite the widely perceived belief that information should be acquired from formal sources, people use formal sources rarely. Instead they gather and apply information from informal sources, chiefly friends and family, throughout their lives.

The informal information systems mainly constitute indigenous knowledge, which is the knowledge about a variety of subjects that is unique to a given culture or society. The informal source of information may be incomplete and may not provide answers to all the problems that rural communities face. However, the aim of formal and ICT-based information systems should not be to replace the informal communication channels. On the contrary, ICTs need to be used to strengthen the existing informal communication channels.

Other sources of information such as the internet were mentioned as sources of information. The internet was used mainly for searching for information on education related issues. Other services provided by the telecentres, such as agricultural and marketing information services, were recorded by 16 (9.8%) respondents as their main source of information and this was only in CROMABU telecentre.

6.5.5 Internet and pornography

In order to understand the usage patterns of the internet by the people in these communities, respondents who said they use the internet were asked to indicate the type of websites that they commonly visited. In this case email-based websites such as, Yahoo, Hotmail and Google mail, were named as the most-visited websites. When these results were compared to the results on websites commonly visited, obtained from the observation of internet search histories, another kind of trend emerged, that is the search histories revealed that users frequented pornography sites.

The use of internet for pornography viewing and its negative effects on society have been raised by a number of studies in Tanzania. Mercer (2005) highlighted the suspicion among Tanzanians concerning the internet-based information and the danger that the internet poses to the 'Tanzanian culture' and sexual morality. Mercer (2005) revealed that internet cafés have generated particularly heated debate with public commentators warning that internet cafés were corrupting the nation's youth. Similar concerns were raised by Pettersson and Carlsson (2004) and Chachage (2001).

Pettersson and Carlsson (2004) pointed out that with the majority of customers viewing pornography in internet cafés and even in some telecentres, the owners of these facilities found themselves involved in conflicting interests with regard to managing access to internet pornography and moral stewardship. In some cases, owners were compelled to close down their internet café businesses because they considered it to be immoral. Pettersson and Carlsson (2004) revealed that internet cafés owners provide special 'dark rooms' where the customer can watch whatever he/she wants, in private. In certain cases, owners of some internet café put up public notices asking customers to refrain from downloading pornography, but again it is difficult to police all customers, at all times, to ensure that they do not download pornography. Other mechanisms for managing access to online pornography, such as the use of content-filtering systems and censorship, were not in use in all the telecentres which were investigated in this research.

This situation is not unique to Tanzania. The internet has generated a large number of moral and legal issues that affect everyone who uses it, worldwide. The widespread availability of the internet has stirred international moral panic, shared by governments, institutions and law-enforcing agencies (Lesame 2005c: 213). Other negative aspects of the internet use are the perpetuation of violence against women, the use of internet as a platform for hate or racist speech and opinions, drug-related information, terrorism, hacking and fraud.

Managing these issues is very difficult, given the free and open nature of the internet services. Burnheim (2004) felt that the balance between protecting free expression online and ensuring that the rights and dignity of others are protected is an extremely delicate one. Regulation of internet pornography is one of the most controversial issues.

As far as telecentres in Tanzania are concerned, there appears to be a lack of information, resources and appropriate policy for managing access to internet pornography. This issue needs to be properly addressed in order to preserve the credibility of telecentres and avoid negative effects that telecentres operations may have on the communities they serve. ICTs are generally considered as tools for development in rural areas of Africa and a much effort and resources are geared towards increasing access to these technologies. However, these negative aspects of the technology cast doubts on the ability of these technologies to bring about socio-economic development in rural areas of Africa.

6.6 Research question V: Impact of ICTs on various aspects of the livelihoods of the people living in the selected rural areas of Tanzania

This objective focuses on the impact of information and communication technologies on the various components of the sustainable livelihoods framework (see Appendix 3.1 and section 3.3.4 in Chapter Three). These include vulnerabilities context, capital assets and structures, processes and institutions. The objective includes livelihoods strategies and livelihoods outcomes that are related to poor livelihoods. This section discusses the components of the sustainable livelihoods in details and the impact of the ICTs on these components, based on data presented in section 5.6 and the summary of result in section 5.8.

6.6.1 The vulnerability context

The sustainable livelihoods framework views people as operating in a context of vulnerability. Within this context, they have access to certain assets or poverty-reducing factors. The vulnerability context influences the livelihood strategies or the various ways of combining and using assets that are open to people in pursuit of beneficial livelihood outcomes that meet their own livelihood objectives (DFID 2001).

In the sustainable livelihoods framework, the vulnerability context frames the external environment in which people exist (Devereux 2001). People's livelihoods and their assets are fundamentally affected by trends such as those in government or politics, technological trends and conflicts. People's livelihoods and assets are affected by shocks such as natural disasters, economic shocks and epidemics. The lives of poor people are affected by seasonal variations in prices, production and economic opportunities. The vulnerability context gains importance through direct impacts upon people's asset status (Devereux, 2001).

In most cases, poor people have limited or no control of these trends, shocks and seasonalities. The vulnerability context can have direct impact upon people's asset status and the options that are open to them in pursuit of beneficial livelihood outcomes. However, not all trends and seasonality must be considered as negative; they can move in favourable directions, too. Trends in new technologies or seasonality of prices could be used as opportunities to secure livelihoods.

DFID (2001) stated that different components of the vulnerability context affect different people in different ways. For instance, changes in international commodity prices may affect those who grow, process or export such commodities, but have little direct effect on those who produce for, or trade in, the local markets. ICT can help poor people and their assets to become less vulnerable to shock, trends and seasonality, by providing access to timely, relevant and adequate information. Gerster and Zimmermann, (2003) stressed that information does not only prevent poor people from exposure to risks but, in case of disasters, it might also help to get aid to the people more efficiently.

In the present study, results relating to impact of ICTs on the vulnerability context are presented in section 5.6.9 of Chapter Five. The communities involved in the study were analysed in relation to their vulnerability context. It was found that the major sources of vulnerability were remoteness, family-related shocks, such as injury or death of a close relative, high unemployment, severe weather conditions, such as excessive drought or flooding, and seasonal variation in the prices and availability of food stuff. The community was found to be vulnerable to the fluctuating global commodity prices of their traditional cash crops such as cotton and coffee.

Concerning the impact of ICTs on the vulnerability context, respondents acknowledged the beneficial impact of mobile phones on the ability to deal with family emergencies such as health issues, injury and death of close relatives. Mobile phones were found to be beneficial in calling for help in cases of emergency. For instance, mobiles were used to call for a taxi or a person with a bicycle in the event that someone became sick and needed to be taken to the hospital. This is something that, a few years ago, people living in rural area could not do.

ICTs, and in this case the mobile phone, were helping these people to be less vulnerable to family emergencies and shocks. Mobile phones were providing them with an opportunity to get help from places beyond their immediate community. Friends and relatives in distant places could respond and offer help where needed. Similar results were reported by Souter *et al.* (2005), where a mobile phone was reported as the most important channel for emergency information and communication between family members.

The mobile phone is helping these people overcome remoteness and access social capital, even from relatives living far away. A study by Souter *et al.* (2005) pointed out that much of the vulnerability that people face comes from lack of knowledge or information. Farmers have often been vulnerable to the marketing power of intermediaries and large companies, due to lack of information.

Information provided by ICTs may not mitigate all the vulnerabilities that rural communities are facing. For instance, it is unlikely that ICTs will affect the fluctuating global commodity

prices of their traditional cash crops such as cotton and coffee. However, the technologies are providing people with information which helps them diversify their sources of income.

6.6.2 The assets pentagon

The livelihoods framework explains that within the vulnerability context defined, above people deploy five types of livelihood assets or capital (represented by the asset pentagon, shown in Appendix 3.1). People's lives are built upon these core asset categories or types of capital. Increasing access (ownership or rights to use them) can make a central contribution to poverty reduction (DFID 2001).

These assets are deployed in various combinations within circumstances influenced by institutional structures and processes, in order to pursue diverse livelihood strategies with more or less measurable 'livelihood outcomes' The assets include social capital, natural capital, financial capital, physical capital and natural capital. These were explained in detail in section 3.3.4. Devereux (2001) stated that the capital assets represent people's strength and it is crucial to analyse their endeavours to convert their assets into positive livelihood outcomes. This study assessed the impact of ICT on three of the five capital assets. These were human capital, social capital and financial capital.

6.6.3 Human capital

Human capital represents skills, knowledge, ability to labour and good health that, together, enable people to pursue different livelihood strategies and achieve their livelihood objectives (DFID 2000). At the household level it varies according to household size, skill levels, leadership potential and health status and appears to be a decisive factor - besides being intrinsically valuable - in order to make use of any other type of assets. Changes in human capital have to be seen not only as isolated effects, but as a supportive factor for the other assets.

As pointed out in section 5.6.3, ICTs such as the internet, community radio and mobile phones had made some positive contribution to human capital. However, the use of ICTs, such as the internet or mobile phones for knowledge acquisition, which are the primary

components of the human capital, was not very common. Similar results were reported by Souter *et al.* (2005), who reported that the telephone is having no impact on information-gathering. Face-to-face communication remains the overwhelming medium of communications for information-gathering. Souter *et al.* (2005) reported that internet use was low and failed to achieve any significant degree of usage in knowledge acquisition.

Training in ICT skills in terms of computer training at the telecentres were found to be helping to extend the human capital and in giving people skills which enable them to acquire jobs and hence extend the financial capital. In a study of community telecentre and rural livelihoods in China, Soriano (2007) reported that the telecentre promoted e-literacy which enabled some users to find jobs. The e-literacy, skills provided by the telecentre helped users to overcome fear of technology and computers and enabled them to benefit from basic computer training.

Duncombe (2006) pointed out that, in terms of human capital, micro-entrepreneurs lack not only ICT literacy but also other business skills such as the effective keeping of financial and transaction records. Duncombe (2006) said that entrepreneurs need to learn these skills first for them to benefit from ICT applications.

In relation to mobile phones, the skills to use the device were cherished by the respondents as their gateway to the information society and the world of ICTs. The ability to use mobile phones formed the basis for easy learning on how to use other ICTs such as computers. Ford and Botha (2007) refer to a mobile phone as a people's computer, which has the computing power of a mid-1990s personal computer. While in rich countries the mobile phone is used as an adjunct to computer and fixed-line telephone, in rural areas of poor countries the mobile phone is the only technology that is ushering rural people into the information society. Having the skills to use the mobile phone is considered very important. The mobile phone does not impose content and allows its users to freely articulate what they want to express. It therefore suits very well the social context of many rural communities.

The examination results for secondary school students delivered online by the National Examination Council of Tanzania (NECTA) was one of the services widely used in all the telecentres. Mlaki (2007) stressed that the application of ICTs in the processing and delivery of examination results in Tanzania led to faster processing of exam results, early release of examination results and, in turn, enabled candidates to join colleges without delay, due to improved access to examination results. In addition, it helped universities validate/crosscheck grades submitted by applicants. Mlaki (2007) suggested that more online transactions needed to be implemented such as e-ordering of results slips, e-registration of candidates and adoption of SMS services. The online delivery of examination results positively impacted on the human capital in rural areas, as it gives people an opportunity to access education services and opportunities faster and at a low cost.

The excitement of the people at the online availability of examination results shows the potential and the demand for other government services and information to be delivered online. The online delivery of government services, which is also commonly known as government to citizen services (G2C), e-government, or eCitizens and eServices, will improve public service delivery along dimensions of quality, convenience and cost. Such services will reduce queues and hopefully corruption in various government services which will in turn improve efficiency. Examples of services which can be delivered online are online delivery of birth and death registration forms, online availability of information on tax returns, online availability of information on legislation and policies. This will make these services more transparent and accessible, to empower people and to eliminate the traditional *ad hoc* way in which officials dealt with citizens.

6.6.4 Social capital

In the context of the sustainable livelihoods framework, social capital represents social resources upon which people draw, in seeking their livelihood outcomes. These include networks and the sense of connectedness that increase people's trust and ability to co-operate. It includes membership in more formalised groups and their systems of rules, norms and sanctions. Goodman (2005) felt that the concept of social capital may be more important for developing countries than developed, as in many cases people in the former have less access

to formalised structures of support such as the legal system, or the financial system, and may rely on informal networks instead.

The result of this study shows that social communication was the main reason why people were using ICTs. Email was mainly used for social communication with friends and relatives living in urban areas and outside the country. Mobile phones were mainly used for communication with friends and family members.

Similar results were reported by Souter *et al.* (2005), where it was revealed that, of the five main categories of livelihoods assets (human, social, financial, natural and physical capital), the telephone is most closely associated with social capital. In a study of micro-entrepreneurs in Botswana, Duncombe (2006) found that the telephone supports informal information systems and helps to support the social networks that substitute for absent market functions. Soriano (2007) revealed that the mobile telephone serves as a convenient tool for tracing relatives and friends' where about and obtaining news. Scott *et al.* (2004) said that, in the case of mobile phones in Africa, social uses such as keeping in touch with family and friends feature strongly. The benefits of this service are a sense of wellbeing, improved income (e.g. arranging cash transfers from family members) and reduced risk (e.g. calls for assistance).

This shows that ICTs are helping to strengthen the social capital and improve relations between people living in rural areas and their relatives living in urban areas. ICTs are helping rural communities keep in touch with family members, obtain news about friends and being informed about, and being able to, respond to family emergencies. Strong social capital is important for the community and ICTs are helping to strengthen it.

Close integration between people living in rural areas and their relatives living in urban areas is also important for rural people in terms of remittances from migrant family members and help in times of need. Creating innovative ICT applications that are tailored to the needs of rural people will make ICTs much more relevant to them. Scott *et el.,* (2004) felt that many of the existing commercial services such as horoscopes, football results and comic services have little relevance to the poor; there is a need to stimulate the development of locally designed, mobile-based solutions for Africa. Various mobile phone solutions, which are tailored to the

needs of rural people in Africa, are on the market today. Examples of these are mobile phone banking and mobile phone money transfer services.

In the case of Tanzania, a company by a name of E-Fulusi (T) Africa, trading under the name Mobipawa, has created a complete mobile banking solution for the people of Tanzania. The Mobipawa service, going by the motto of "*simu ni Benki*" in Swahili, meaning "a phone is a bank", became available to citizens in November 2007 (Mahunnah 2007). Through this service people are able to open an account (mobipawa account) where they can deposit and save money, transfer money to other mobipawa account holders, and non-account holders all through a mobile phone. Other transactions which can be performed on a mobile phone are payment of certain bills and other simple transactions. Customers can have their salaries deposited directly into their mobile phone accounts (Sebastian 2007).

Other similar services are mobile phone application that capitalises on smooth, affordable and convenient remittances transfer. The mobile phone money transfer services are currently provided by Zantel in Tanzania. Vodacom Tanzania plans to launch similar services later in 2008. A similar service is provided by Safaricom in Kenya going by the name M-Pesa. M stands for mobile and *pesa* is the Swahili word for "money". Air-time transfer services provided by mobile phone operators in Tanzania provide a *de facto* mobile phone money transfer service. Faludi (2005) coined the air-time transfers services as a new currency, a cyber currency, that can be sent anywhere within the mobile phone network, at the press of a button, without needing a bank account or incurring high bank charges.

Mobile banking and mobile phone money transfer services make remittances transfers simple, affordable and quick for the rural population with no access to banking services. These services are very interesting for Africa, given the huge number of people without access to banking services. In Tanzania, it is estimated that the total number of bank accounts is only two million out of a total population of 35 million. This number includes bank accounts for businesses, government, NGOs and individuals. At the same time, total number of people with access to mobile phones now stands at six million (Vodafone 2008; Mahunnah 2007). Mobile phone banking services have the potential to reach many people with no access to banking services, especially in rural areas.

Another aspect of social capital that is facilitated by the telecentres is the provision of a venue where people can meet and exchange idea, information and knowledge. This facility provided an opportunity for telecentre management in two telecentres (CROMABU and Sengerema) to organise the community into groups that, among other things, operate as a credit co-operative society (SACCOS). The SACCOS societies not only help to strengthen the social capital but they are also helping the community members financially. This is important in communities with no access to banking or insurance services.

Soriano (2007) agreed that the telecentres provided an additional common space for communities to meet and exchange information concerning employment and other opportunities available. They allow the exchange of information on major events happening in their communities and in the country as a whole.

6.6.5 Financial capital

Financial capital denotes the monetary resources that people use to achieve their livelihood objectives. It comprises the important availability of cash or equivalent that enables people to adopt different livelihood strategies.

In terms of financial capital, the telecentre services, such as computer training, enabled community members to secure employment or self-employment opportunities, which ensure people access to financial capital. The agricultural marketing information services provided by one telecentre provided farmers with information on the price of their products in various markets within their surroundings. The results of this are presented in section 5.2.2.6.

Following the market liberalisation reforms undertaken by the Tanzanian government in the early 1990s, Tanzania opened its markets and has been encouraging foreign investment in a broad range of sectors, including agriculture. In the agricultural sector, these policies were characterised by removal of state control on the price of goods and services in the market and the liberalisation of the co-operative marketing system at farm level, by removing restrictions which hitherto hindered private traders from purchasing crops directly from villages and farmers to promote price competition (Temu and Temu 2006; Mwakalobo 1999).

Despite good intentions, these policies led to a number of constraints on small-scale farmers. Consequently, agricultural markets are characterised by long chains of transactions between the farmgate and consumers; poor access to appropriate and timely market information; small volumes of products of highly varied quality offered by individual smallholder farmers; and poorly structured and inefficient markets, (Mukebi 2004). Due to lack of timely marketing information, small-scale farmers are normally exploited by the middlemen.

Providing information that links farmers directly to markets or wholesale buyers in the markets is essential for Tanzanian small-scale farmers. This is because the multiple middlemen in the marketing chain each taking a commission at every stage of the chain. Price variations in space and time are often large and erratic. Molony (2006b) and Mukhebi (2004) showed that lack of market information represents a significant impediment to market access, especially for poor smallholder farmers in remote rural areas.

In the Tanzanian context there is no one and fixed price for most agricultural products. Prices are always negotiated and bargained. Therefore it is crucial for farmers to know the price that their products fetch in other markets, especially in urban areas. This enables farmers to know the real market value of their produce. With access to pricing information for their products, smallholder farmers in rural areas are being empowered to bargain for better prices in the marketplace. Providing the pricing information to farmers improves the competitiveness of farmers and creates equal opportunities for farmers in the market against middlemen. It levels the ground between the male and female, rich and the poor, young and old farmers, as well as small-scale and large-scale farmers. Better access to markets and better prices ensures better incomes for the farmer and helps them fight poverty.

The use of mobile phones in the delivery of marketing information to farmers has been successfully tried in a number of countries. In Kenya, the services are provided by the Kenya Agricultural Commodity Exchange Limited (KACE) (Mukhebi 2004). In Uganda similar services are provided by MTN Uganda and Foodnet - an organisation which works for greater market efficiency and value added processing in the agricultural sector (Roberts and Kernick 2006; Ross 2004). In Tanzania, access to marketing information via SMS or other mobile

phone based services is not common, except in cases where farmers have a direct communication with buyers or people located in the market and they acquire marketing information from them. Although the Ministry of Industry, Trade and Marketing has been implementing SMS agricultural market information with Vodacom since 2005, the programme has not yet been marketed by either party in rural communities, apart by word of mouth. There has as yet been no impact evaluation of this initiative (McNamara 2008). None of the respondents involved in this study indicated that they were aware of, or were using, the initiative. Marketing information is sometimes broadcast on national radio, which mainly covers large city markets, which farmers in rural areas cannot access. Farmers need such information, starting at the local level.

In terms of the impact of mobile phones on the financial capital, respondents reported that the mobile phone is helping them to save money, which would otherwise be used in travelling. In many cases, business people in rural areas reported that they order supplies in urban areas using mobile phones and the supplies are sent to them by the normal public transport system. With local passenger buses (both in large towns and in districts) operating as courier companies, the mobile phone e-commerce loop is closed. Although very few of these companies have been registered as official courier companies, many still offer those services without official registration. Most of the registered courier companies only operate in big cities (TCRA 2008). In the rural areas and in the districts this kind of business is normally based on trust and a small fee is paid by the users of the service.

Souter *et al.* (2005) reported that the telephone was considered to have value by a high proportion of users when it came to saving money (for example, by saving transport or postal costs), but it is not considered to have value by most users when it comes to earning income. In this study some respondents reported that mobile phones create employment and entrepreneurship opportunities through re–selling of the service, selling of the air-time vouchers and operating mobile phone battery charging services.

6.6.6 ICTs and diverse livelihood strategies

Livelihood strategies are approaches that people make, using assets that they have access to in order to secure livelihoods outcomes. It comprises a range of activities and choices that people undertake in order to achieve their livelihood goals (Devereux 200; DFID 2002). To explain further the concept of livelihood strategies, DFID (2002) explained that it constitutes a dynamic process through which people combine activities to meet their various needs at different times and on different geographical or economic levels.

Information provided by the telecentre enabled some farmers to try new livelihood strategies and adopt them in combination with the existing ones. This was especially the case in Magu and Karagwe districts (refer to section 5.2.2.7 in Chapter Five). In Magu district a group of women, the Isandula women group, learned how to cultivate mushrooms and more productive techniques for raising indigenous chickens. This information complemented their traditional livelihoods strategies that mainly relied on the cultivation of cotton as a sole cash crop. In Magu district young people were encouraged to cultivate vegetables to complement their livelihood strategies which mainly relayed on cotton cultivation. In Karagwe district, the cultivation of highly valued agricultural products such as spices, vanilla, fruit and vegetables complement the traditional livelihoods strategies that mainly relay on traditional cash crops such as coffee.

Providing opportunities for farmers to diversify their livelihoods is very important given the global decline of the price of the traditional cash crops from Africa. For a long time farmers in Tanzania have relied on the cultivation of traditional cash crops for their livelihood and as their means for economic growth and development. These crops include cotton, coffee, tobacco, cashew nuts, tea and sisal. Profits from traditional export commodities have been declining over the years due to a drop in world prices and, as a result, domestic production has declined and farmers who were solely dependent on these cash crops have been deeply affected (Temu and Temu 2006).

Another form of livelihoods diversification that rural people are adopting is diversification towards a more formal kind of employment, education and computer training at the telecentres. Parents are diversifying the livelihoods of their children by taking them to school and getting them to learn computers at the telecentre. Telecentres are helping in this by providing information on various educational opportunities in the country and outside the country. In a unique case, young people in Sengerema district seem to embrace the popular culture that they learn from the internet. Finally, these young people desert rural settings for urban centres. This was reported by (Mercer 2005). The negative aspect of this kind of livelihoods diversification is the diminishing human capital resource in rural areas as the new generation is working towards a more formal education, the entertainment industry and different careers.

6.6.7 Transforming structures and processes

Transforming structures and processes represent institutions, organisations, policies and legislation that shape livelihoods (DFID 2000). They are of central importance as they operate at all levels and effectively determine access, terms of exchange between different types of capital and returns to any given livelihood strategy (Shankland, 2000; Keeley, 2001). Structures which Devereux (2001) called 'hardware', represent private and public organisations that set and implement policy and legislations, deliver services, purchase, trade and perform all manner of other functions that affect livelihoods (DFID, 2000). Processes which Devereux (2001) called 'software' determine the way in which structures and individuals operate and interact. Important processes for livelihoods are, for instance, policies, legislation and institutions, but also culture and power relations.

The "transforming structures and processes" aspect of the sustainable livelihoods framework provides a macro–micro policy link. The sustainable livelihoods framework emphasises the importance of macro-level policy and institutions to the livelihood options of communities and individuals. It stresses the need for higher level policy development and planning to be informed by lessons learnt and insights gained at the local level (DFID 2002). The framework provides a way of grounding policies and interventions in reality and taking a broader look.

In the ICT sector, policy-making strategies and legal and institutional framework at the national level have a profound impact on the accessibility of ICTs by the people living in rural areas. The actions of institutions such as the ministry responsible for ICTs and the regulatory authority (TCRA) affect access to ICTs by rural people. So far, processes such as the reform of the telecommunications sector have brought significant changes to the telecommunication landscape in Tanzania. More pro-poor and pro-rural policies and strategies are needed to address the rural–urban ICT access imbalances. Many ICT initiatives have gone ahead in relative isolation and without the benefit of central and local co-ordination. Therefore the networking and central co-ordination aspect is needed at the national policy-making level.

Due to the cross cutting nature of the ICT sector, ICT-based projects and initiatives should be implemented in co-ordination with other sectors. The results of this study showed that most farmers are vulnerable to various agriculture-related challenges. There was very little co-operation among telecentres, for example, and the people from the agricultural sector at the national level and at the local level in the districts. This study shows that there is a separation between "rural experts" and "ICT experts" and therefore ICTs solutions do not address the real needs of rural people. Zappacosta (2008) stated that ICT policy is a crosscutting domain, affecting several policy areas such as technology, research, industry, telecommunications, agriculture, education and health. Without properly considering these elements during the process of policy formulation, ICT diffusion would not match local needs and circumstances and its impact in terms of rural development could be limited or even be negative.

The study revealed that mobile phone access is highly valued by all sections of the community. This is especially the case for its potential role in social communication and in dealing with family emergencies. The mobile phone will be even more valuable because of new services such as mobile banking and money transfer services. This implied that policies that will make this technology more accessible, affordable and ensure quality of services in rural areas will have a substantial social and economic value for the rural communities. At the moment, the quality of mobile phone services in most rural areas is poor and the networks are always patchy and totally absent in certain areas.

Poor people will certainly benefit from improved mobile phone services and will be empowered by opportunities to engage with governance structures. This is due to the fact that the mobile phone technology is being adopted at a very fast rate and new services are always been introduced. Further research to assess the impact of this technology on livelihoods and the adoption trends, over time, will be beneficial.

6.7 Research question VI: Barriers to effective utilisation of ICTs in the selected rural areas of Tanzania

The results of this objective are presented in section 5.7.1 of Chapter Five. The discussion will deal with barriers that respondents were facing with regard to the use of internet and other services provided by the telecentres. Barriers to the use of mobile phones will also be discussed. Finally, this section will discuss the negative consequences or problems that may be caused by misuse of the ICTs.

6.7.1 Barriers to the use of internet and other services provided by the telecentre

These included language barriers**,** lack of skills to use the technology, lack of time to attend the training programmes, the high cost of the computer training programmes and personal barriers.

6.7.1 .1 Language barriers

Lack of understanding of the English language (the language of the computer) was mentioned as one of the reasons why people were not able to use the internet and attend computer training programmes at the telecentre. It was interesting to note that language is still one of the main barriers to the use of the internet and other services provided by the telecentre, despite some efforts to localise and translate some computer programs. In one telecentre (Sengerema) the telecentre introduced English classes, where people are taught the English language first before enrolling in computer classes.

6.7.1 .1.1 Computer localisation projects in Tanzania and their use

At the moment Tanzania has a number of Swahili versions of computer programs. These include Jambo Open Office, "Jambo Mozilla Firefox 1.0.3" and 'KKK Tuwasiliane'. However, observations and interviews with staff of the telecentre indicated that these programs were rarely used. Computer trainers at the telecentres said it is hard to use such programs because the translated Swahili version has Swahili vocabulary, which is not easy to understand. Many users do not like learning computers from these Swahili versions of the programs. This was mainly because there is no motivation to learn computers in Swahili. Learning the computer in the English language is associated with more employment and other economic opportunities. Different projects and initiatives have been geared towards translating some of the computer programs into the Swahili language. Examples of these projects include the open Kiswahili localisation project, the Kiswahili version of the Microsoft office project and the 'KKK Tuwasiliane'.

6.7.1 .1.2 Open Kiswahili Localisation Project (kilinux)

The open Kiswahili localisation project (kilinux) is the project of the Department of Computer Science (DoCS), in collaboration with staff from the Institute of Kiswahili Research (IKR) and the College of Engineering and Technology (COET) at the University of Dar es Salaam (Klnx 2004). The aim of this project is to localise free and open source software to the Swahili language. In addition, the project aims at creating awareness among Swahili speakers of the benefits of using and extending open source software.

So far the project has been able to localise two open source software. These include Jambo Open Office, which was released in February 2005. Jambo Open Office was translated from the English version of OpenOffice.org, which is an open source suite with four components. These include word processor, spreadsheet, presentation creator and drawing program. OpenOffice is being translated into nine official languages in South Africa by Translate.org.za (Klnx 2004).

Other software translated into Swahili by the 'kilinux' project is the Kiswahili web browser called "Jambo Mozilla Firefox 1.0.3", which is a Kiswahili version of Mozilla Firefox 1.03.

The “Jambo Mozilla Firefox 1.0.3” was released in September 2006 (Kiswahili Linux Localisation Project 2006).

6.7.1 .1.3 Kiswahili version of Microsoft office

This is another localisation project, based in Nairobi, Kenya. The project produced software that can translate Microsoft office programs into Swahili. The software was released in Nairobi, Kenya, in December 2005. Currently, Microsoft Word, Excel, Outlook, PowerPoint, and other computer programs can be converted into Kiswahili by using a free program called Language Interface Pack that can be downloaded from the internet (Phombeah 2004; Majtenyi 2005).

6.7.1 .1.4 ‘KKK Tuwasiliane’

This is another Swahili localisation project. ‘KKK Tuwasiliane’ stands for “Kiswahili Kitumike Kuwasiliana”, meaning “Swahili should be used to communicate.” ‘KKK Tuwasiliane’ is a Swahili web browser which was based on Mozilla Firefox. The ‘Tuwasiliane’ web browser was released in 2007 and it was introduced to internet users in the Sengerema Multipurpose Community Telecentre and in Kasulu Teachers Training College (TTC) in Kasulu, Kigoma (TAFOSSA 2007).

In all the four telecentres visited, only FADECO telecentre had installed Jambo Open Office in their computers and users were given an option to choose whether they want to be trained how to use computers in Swahili using the Jambo Open Office, or be taught in English using Microsoft Office software. According to the staff of the Sengerema Multipurpose Community Telecentre, the ‘KKK Tuwasiline’ web browser was installed in their computer. However, the program was deleted when the computers were formatted and it was never reinstated (TAFOSSA 2007).

These results of the present study show that the use of localised software is generally low. They are not very different from the experience of other countries with regard to the use of localised computer programs. In South Asia, Keniston (1999) stated that despite valiant and brilliant efforts to develop local language software, their impact has been restricted and with less widespread acceptance. In South Africa, Bailey (2006) indicated that there is no demand

for the localised software. In another study Osborn (2006) pointed out that the use of African languages in ICT appears to be marginal in Africa, because the factors that define the digital divide also tend to minimise the potential for African language use in ICT. Connectivity is centred on cities and towns where the same languages that are dominant on the internet may be more widely spoken. Only people with means and education, who are also more likely to be literate in languages used in ICT, can access computers and internet connections.

Osborn (2006) revealed that there is low motivation or the will to use African languages in ICTs because the issues surrounding the use of the vernacular in Africa are complicated by factors such as status and attitudes towards what is indigenous *vis-à-vis* languages that are seen as providing more economic opportunity. The literacy level with regard to African languages is low.

6.7.1.2 Other barriers

In terms of ICTs services provided by the telecentres the findings of this study indicate that, in the researched areas, lack of access of the technology (physical access) poses a lower barrier than cost/affordability, lack of time to attend computer training programmes and personal barriers. Darkenwald and Merriam (1982), quoted by Hashim (2008), stated that the barriers that people face with regard to the use of ICTs can be categorised into two groups, situational barriers and psychological barriers.

Situational barriers relate to an individual's life context at a particular time, that is the realities of one's goals and physical environment. They include cost/affordability, lack of time to attend computer training programmes, lack of transportation and geographical isolation. Most of the respondents in this study stated that the cost of mobile phone services was too high. These results concur with those of McNamara (2008), whose respondents complained of the high cost of the phones, air-time and the price of repairing the phones. They lamented that the phones themselves do not last long.

Psychological barriers are individually held beliefs, values, attitudes, or perceptions that inhibit participation in organised learning activities. They include respondents who believed

they need to be highly educated to be able to use computers and those who were afraid of the technology.

6.7.2 Barriers to the use of the mobile phones

These are affordability and barriers associated with the high cost of buying and maintaining the mobile phone. Another barrier is associated with the difficulties involved in charging the phone in places where there is no electricity.

Another barrier is associated with illiteracy. Some respondents said they cannot use most of the basic functions of the mobile phones, such as SMS, mainly because of illiteracy and language barriers. Most respondents confessed that they can make a call but they cannot utilise the SMS feature or use the address book or other phone functions that require text, editing such as creating a contact, saving a text message or creating a text message. In cases where a mobile phone was shared, contact information was written and updated by a literate family member.

Chipchase (2008) found that emerging mobile phone markets that include Asian and African countries have higher numbers of textually non-literate people than in developed markets. Chipchase's (2008) used the term "textual non-literacy", based on the UNESCO definition of illiteracy as a 'person who cannot with understanding both read and write a short simple statement on their everyday life'. The mobile phone users may be literate or semi-literate in only a language that the phone user interface does not use and this poses a barrier to effective use of the technology. This was the case for most respondents in this research, where the majority of the people were literate in Swahili, while mobile phones with Swahili phone user interface were rare.

6.7.3 Negative consequences that may be caused by the misuse of the ICTs

Other problems which were mentioned by the respondents were the negative consequences that ICTs pose to society. These were the threat that the internet is posing to local cultures, values and systems. This was the major concern of the older generation in the society. Mobile phones were also blamed for creating new kinds of problems such as organised crime. The same results were reported by McNamara's (2008), where ICTs were condemned for causing

a distortion of culture, increased violence and crime, exposing the young to pornographic material and facilitating unethical meetings, especially among the youth.

These are examples of negative social capital which may be created by ICTs and which do not benefit the community. Social capital is not always positive. From the perspective of wider society, some forms of social capital are clearly damaging, while others are barriers to equal opportunities. Related problems and similar negative social capital created by ICTs have been experienced in other countries. These situations portray the dual-use possibilities of the utilisation of mobile phones, community radio and other ICTs. In December 2007, in post-election violence in Kenya, mobile phones were used as instruments of both war and peace. After the government imposed a media blackout, Kenyans sought news and information via SMS on their phones and used them to track down friends and family who had fled their homes. Many reported receiving unsolicited text messages to take up arms (Corbett 2008).

In the same period, some Kenyan community radio stations or vernacular radio stations, as they have been called in Kenya, played critical roles before and after Kenya's general elections. While in some cases they provided important information on the election, they were also accused of inciting violence by playing war songs and stirring communities to action and calling people to arms (Oriare 2008; BBC 2008; Luft 2008; Oyaro 2008).

An extreme case of this sort is the issue of genocide in Rwanda in 1994, where the extremist Hutu radio station Radio-Television Libre des Milles Collines (RTLM), played an instrumental role in laying the groundwork for genocide, then actively participated in the extermination campaign. Authorities used the radio station to give instructions and orders to listeners and identified specific targets for attack. The radio was even used to guide the killers towards their victims. The killers were seen on the streets of Kigali with a machete in one hand and a radio in the other (Thompson 2007).

6.8 Summary

Chapter Six presented an interpretation of the research findings in the light of ICTs and livelihoods theories and literature. The discussion in this chapter reconsidered the results that

were established in Chapter Five and provided their implications for this study**.** In interpreting research findings, an attempt was made to show how the current research findings concur or differ from previous studies of a similar nature.

The interpretation of the research findings covered the results of all the specific objectives indicated in section 5.0, except the last specific objective, namely to recommend a model for effective implementation of ICTs and their use for sustainable livelihoods in the selected rural areas of Tanzania. This is covered in Chapter Seven.

Chapter Six has shown that ICT sector development in the researched areas is still low and is limited by the under-development of other sectors such as electricity and roads. This negatively affects the utilisation of ICTs for sustainable livelihoods. Based on the findings of the study, Chapter Six demonstrated gaps that exist in national ICT policy-making and implementation. These gaps, in turn, affect the overall sector development, especially in rural areas. Information needs assessment is critical in the development and running of a relevant information service. Telecentre management rarely conduct information needs assessments for the communities they serve and because of this they are not able to fully meet the information needs of their communities.

Chapter Six has shown that the implications to ICTs on the capital assets of the sustainable livelihoods framework extend to economic issues such as better earnings and saving money, social issues, such as community interaction and knowledge sharing, better follow up for remittances and the creation of savings and credit co-operative societies. The implications extend to human issues such as ICTs literacy, improved farming techniques and information on new cash crops.

The next chapter is a summary of the results, conclusion and recommendations. A new model for effective implementation of ICTs and their use for sustainable livelihoods in the selected rural areas of Tanzania is proposed.

CHAPTER SEVEN
SUMMARY, CONCLUSIONS, RECOMMENDATIONS AND A NEW MODEL

Chapter Six dealt with the interpretations of the findings of the study. The main purpose of the interpretation chapter was to search for the broader meaning of the research findings and relate the findings to the existing theories and literature. Chapter Seven provides a summary of the findings, conclusions and recommendations of the study, based on the data presented and interpreted in the two previous chapters, and the research experience gained during the conduct of the project.

7.1 Research purpose, research questions and summary of the findings

The following section restates the purpose of the study and the research questions that guided the study and presents a summary of the findings of the research.

The research question which this study investigated was: how and for what purposes are ICTs used by people in the selected rural areas of Tanzania and what is the impact of ICTs on various aspects of their livelihoods. In order to fulfil the purpose of the study, the following research questions guided the study:

1. What is the current status of ICT the sector development in the selected rural areas of Tanzania?
2. What policies are in place to facilitate development and utilisation of ICTs in the selected rural areas of Tanzania?
3. To what extent do people in the selected rural areas of Tanzania have access to ICTs?
4. What are the use patterns of ICTs by people in the selected rural areas of Tanzania?
5. What is the impact of the use of ICTs use on various aspects of the livelihoods of the people living in the selected rural areas of Tanzania?
6. What are the barriers to effective utilisation of ICTs in the selected rural areas of Tanzania?
7. What is the appropriate model for effective implementation of ICTs and their use for sustainable livelihoods in the selected rural areas of Tanzania?

7.2 Summary on research findings based on research questions

This section presents a summary of the research findings based on the objectives of the study.

7.2.1 Summary on the characteristics of the respondents

1. The findings of this study were that telecentre users in the areas under investigation were generally young, with ages between 18 and 35. There was generally an absence of old people in most telecentres;
2. The majority of the users of the internet and other services provided by the telecentres were males. This finding show gender disparity in access to ICTs. Female access to ICT was remarkably low, in comparison to male access. This is because the gendered nature of the social, economic, policy and technological systems that frame opportunities for women were not being taken into account in most ICT initiatives;
3. The findings of the study show that those individuals with higher levels of education were the more frequent users of computer and internet, compared with those with lower levels of education. Education was often closely correlated with income, which facilitated the purchase of ICTs and inclusion in the work environment;
4. Although respondents involved in the informal sector represented the majority of people in the research areas, the majority of the ICT users were the respondents employed in the formal sector and students; and
5. With regard to mobile phone services, the findings of this study show that there were no noticeable gender differences in terms of access and the use of mobile phones. Other gender differences such as in terms of educational level, sectoral disparities and age disparities were not established.

7.2.2 Summary of the current status of ICT sector development in the selected rural areas of Tanzania

1. The roads in three of the four districts involved in the study were in terrible condition. This made it difficult for farmers to transport their produce to markets outside the districts, even in cases where the farmers were provided with information on the availability of those markets;

2. The majority of the people did not have access to electricity. In all the districts involved in the study, less than 10 percent of the population had access to electricity;
3. Basic mobile phone services were available in all the districts. However, respondents indicated that the quality of the services were poor. In certain locations the network was patchy or non-available;
4. None of the telecentres were providing telephone services to the public or selling air-time vouchers. Two of the telecentres had telephone booths, but they were rarely used. Public telephone services were mainly provided by private entrepreneurs such as "Vodacom people's phone services" and other makeshift public phone service providers;
5. Air-time vouchers were widely available in almost all local shops in the districts. However, respondents indicated that further from the district headquarters into the villages, the prices of air-time voucher increased by at least 10 percent;
6. In all the districts, telecentres were the only places that provided reliable public access to the internet. There was an emerging trend towards providing ISP services to the community by the telecentres, as a way of generating more income for the telecentres;
7. Three out the four districts involved in the study had community radios. It was found that community radios contributed considerably in reporting local news and in strengthening the social fabric of the communities; and
8. In three districts, respondents complained of terrestrial television signals and even radio signals from radio and television station broadcasting from urban areas which were generally weak or non available.

7.2.3 Summary of policies to facilitate development and utilisation of ICTs in the selected rural areas of Tanzania

1. There was a gap in the ICT policy-making and implementation, because the then Ministry of Infrastructure Development did not play its policy-making function effectively;
2. The implementation strategy document for the national ICT policy is still in a draft form, although the policy is currently used for planning purposes;
3. Infrastructure development and universal access policy are the two policies on which the ministry is currently working. The new national fibre optic cable which the

government is currently building will terminate in all the 26 district headquarters in Tanzania;

4. The Tanzania ICT policy formulation has been characterised by long delays in the implementation of important policy objectives such as the universal access policy and the ICT policy it self; and
5. High licence charges for telephone operators and other connection taxes are transferred to customers. This makes the services prohibitively expensive for the majority.

7.2.4 Summary on access to ICTs by people in the selected rural areas of Tanzania

1. In one district, nearly 50% of the respondents were not aware of the telecentre and its activities. In other districts the majority of the people were aware of the telecentre and its services;
2. The majority of the respondents lacked skills to use the computers;
3. For the non-users of the telecentres, the barriers in their use of ICTs were high cost of the services, lack of skills and language problems;
4. Accessing the internet was given as an important reason why people visited the telecentres;
5. In all the telecentres, emails were mainly used to communicate with friends and relatives, as opposed to business or knowledge acquisition;
6. Mobile phones were the type of telephones used by most people; and
7. The majority of the people had access to a mobile phone, either by ownership or borrowing from friends and relatives.

7.2.5 Summary on use patterns of ICTs by people in the selected rural areas of Tanzania

1. Business-related information was the main information needed by most people in the communities studied. This information was, however, not provided by any of the telecentres visited;
2. Agriculture-related information was the second most needed information by the people in the communities visited;
3. Education-related information was mainly provided by searching the internet at the telecentre;

4. Face-to-face communication and the radio were the major sources of information that the respondents used; and
5. The internet was mainly used for web-based email accounts and pornographic websites.

7.2.6 Summary of the effect of ICTs use on various aspects of the rural livelihoods

This section will provide a summary of the results of the three capital assets which were analysed in this study in relation to ICTs. These are social capital, human capital and financial capital.

7.2.6.1 ICTs and social capital: internet and other services offered by telecentres

1. Email was found to be the primary reason for using the internet;
2. Email was mainly used for social communication with friends and relatives living in urban area and outside the country;
3. The telecentres provided a venue where people could meet and exchange ideas, information and knowledge;
4. A strong social capital is important for the community and ICTs are helping to strengthen it;
5. Some of the telecentres organised community members into groups and provided a space where these groups could meet;
6. The social capital from the groups provided a means for members to share problems and live together;
7. In two districts, groups were operating as a Savings and Credit Co-operative Society (SACCOS); and
8. The savings and credit co-operative societies mobilise savings from members to create a pool of funds from which they access loans at fair and reasonable rates of interest.

7.2.6.2 Community radio and social capital

1. The community used the radio to communicate and pass messages in cases of death, sickness and various events happening in the society;
2. They were able to report missing children and missing livestock; and

3. Community radios were used to send greetings to one another thereby strengthening the social fabric of the society.

7.2.6.3 Mobile phones and social capital

1. Mobile phones were mainly used for social communication;
2. Respondents said that without mobile phones they would have to travel to different places to see relatives more often and this is expensive;
3. Relations between people living in rural areas and their relatives living in urban areas has improved because of mobile phones; and
4. The improved relations are important for rural people in terms of remittances from migrant family members and help in times of need.

7.2.6.4 ICTs and human capital: internet and other services offered by telecentres

1. The majority of the respondents said they rarely used the internet for knowledge acquisition;
2. Respondents indicated that they used the internet to access information about education and opportunities for further studies;
3. Respondents said that they could easily access exam results for secondary school students using the internet services provided by the telecentre. This made it easy to follow up further education opportunities and reduce unnecessary delays; and
4. Some telecentres organised seminars, in partnership with other NGOs, which gave people opportunities to learn new ideas.

7.2.6.5 Mobile phones and human capital

1. Respondents were excited with their knowledge of using the mobile phone device. For most people the mobile was like a small computer that they had access to; and
2. Many started using a mobile phone and later on learned to use computers and they said it was easy this way, because the principles were the same.

7.2.6.6 Community radio and human capital

1. The community radio broadcasts local news and information;
2. One respondent said it acts like a ‘talking drum’ for the community; and

3. There are very few educational programmes on community radio due to staff and expertise limitations.

7.2.6.7 ICTs and financial capital: internet and other services offered by telecentres

1. Marketing and information prices provided by the telecentres enabled farmers to get fair prices for their products;
2. The pricing information empowered them and gave them more bargaining power over the business middlemen;
3. Respondents who own computer and ICT-related businesses use the internet for down-loading software and antivirus programmes;
4. The internet helped people who were looking for employment. Various job opportunities and applications for tenders are advertised on the internet;
5. The community radio was used for local business advertising;
6. Computer training provided by the telecentre enabled some to get jobs in NGOs, companies or secretarial service shops;
7. Computer training created self-employment;
8. One respondent pursued a career in telemedicine after being trained by the telecentre and is still using the telecentre facility to offer telemedicine services to the community; and
9. A few started secretarial bureau businesses after being trained at the telecentre.

7.2.6.8 Mobile phones and financial capital

1. Mobile phones created employment and entrepreneurship opportunities;
2. Business people use the mobile phone to communicate with suppliers and customers;
3. Mobile phone helped people in business to check the availability of supplies before travelling;
4. Respondents said that without the phone they would have to travel long distances and the cost of doing business would go up and they may lose customers;
5. For farmers the phone was used to enquire about the prices of their products in different markets, e.g. farmers of perishable agricultural products said they normally communicate with customers when their produce is ready and they cannot do that business without a phone; and

6. The respondents acknowledged the beneficial impact of the phone on the ability to deal with family emergencies.

7.2.6.9 ICTs and diverse livelihoods strategies

1. Information provided by the telecentre enabled some farmers to try out new livelihood strategies and adopt them in combination with existing ones;
2. In one district a group of women learned how to cultivate mushrooms and more productive ways of raising indigenous chickens;
3. This information complemented their traditional livelihoods strategies that mainly relied on cultivation of cotton as a sole cash crop; and
4. In other districts the cultivation of highly valued agricultural products such as spices, vanilla, fruit and vegetables complement the traditional livelihoods strategies that mainly relied on traditional cash crops such as coffee and cotton.

7.2.6.10 ICTs and vulnerability context

1. The respondents acknowledged the beneficial impact of the mobile phone on the ability to deal with family emergencies;
2. This was mainly associated with health issues, injury and death of a close relative;
3. The respondents said that in cases of emergencies they were able to call other relatives who were living far away for help and financial assistance; and
4. In one district, respondents indicated that they used the mobile phone to call a taxi or a person with a bicycle in case of an emergence, or if someone got sick and needed to be taken to the hospital. This was not possible in the past.

7.2.7 Summary of the barriers to effective utilisation of ICTs in the selected rural areas of Tanzania

1. Affordability, computer illiteracy, distance to the telecentre and language were named as the barriers that hinder effective utilisation of the services of the telecentre;
2. In the case of mobile phones**,** the high cost of buying and maintaining mobile phones, difficulties involved in charging mobile phone batteries once they were down and language barriers were given as barriers that hinder effective use of this technology;

3. Lack of skills to use ICTs such as computers and mobile phones. The SMS is considered to be a cheap means of using mobile phones. However, it is not used much due to lack of skills and the literacy required;
4. Poor transport and communication infrastructure. Farmers still have many other limitations besides the lack of information. For instance, farmers were provided with information on markets but could not make full use of the information because of lack of transport facilities and the inability to produce in large quantities;
5. Lack of electricity and constant power cuts. These cause interruptions in the radio programme and other telecentre services;
6. The respondents said that ICTs have created new kinds of problems, such as easy access to pornographic content, which is considered immoral and against the "Tanzania culture". Increased access to mobile phones has resulted in a higher rate of organised crime; and
7. Sustainability of telecentres is still an issue.

7.3 CONCLUSIONS

The conclusions of the study were drawn from the research findings. An attempt was made to link the conclusions drawn with the larger issues of the use of ICTs and access in rural areas and their effect on livelihoods. The conclusions were drawn according to the order in which the research objectives were stated in Chapter One, section 1.3.1.

7.3.1 Conclusion on the characteristics of the respondents

Findings on the characteristics of the respondents indicated that telecentre users in the researched areas were generally young, the majority were males and with higher levels of education. From these results it can be concluded that, while access and use of ICTs might help people living in rural areas achieve livelihoods sustainability, the statistical breakdown of the users of ICTs in these areas, in terms of gender, age, level of education and occupation, raises some concerns about who will really benefit from these technologies.

The results and discussions of the characteristics of the respondents shows that the telecentres have failed to take into consideration the extremely poor and disadvantaged individuals in the

provision of ICT service to the community. Other groups less represented in the telecentre services are farmers and those involved in activities of the informal sector. Both of these groups are considered as 'target-user groups' by the telecentres, but they were significantly under-represented among telecentre users. This aspect is considered a remarkable weakness in conventional ICT for development programmes.

Of all the telecentres involved in this study, only one, the CROMABU telecentre, was working with farmer groups and was actively involved in collecting and disseminating marketing information for farmers. The rest of the telecentres hardly reached the poorest of the poor or even farmers. There were no actively running programmes to reach farmers in other telecentres. It can be concluded that, although there is some progress in terms of providing access to ICTs to the rural communities, the challenge of reaching the prime target (farmers) with ICT services is still daunting.

These findings emphasise the fact that simple relationships between development and ICTs may not be realistic. The assumption that providing ICTs services in the form of telecentres will benefit the farmers may not be realistic.

The findings are in line with the multiple stakeholder model of the Washington State University (WSU), suggested in section 3.4.2 in Chapter Three, that underscores the importance of understanding the community members as the top stakeholders in the deployment of ICTs for socio-economic development. The model suggested that community members are the major beneficiaries of any initiative to bridge the digital divide. In this regard, the emphasis should be on making ICTs widely available and affordable so that the community can utilise ICTs to expand local education, enhance local health care, improve civic interaction and develop mechanisms for community support. The model suggested that, people need to have the knowledge and skills to use it on the technology, for the technology to have an impact on their livelihoods.

In the case of mobile phones the use of this technology was characterised by greater uniformity across socio-economic groups and gender, compared to other ICTs. The

implication of this is that the digital divide could be smaller in the case of mobile phones compared to other ICTs. This result indicated that the mobile phone is the kind of ICT that is more driven with the pull from the demand side than the push from the supply side, as indicated by the pull and push model of Heeks (2005a), in section 3.4.3.3 of Chapter Three. This explains the reason why the adoption of this technology has been so successful within a small span of time, even in the rural areas. The success of mobile phone technology is mainly due to the demand side pulling rather than the supply side pushing. For the ICT technologies to be effectively utilised for livelihoods sustainability they need to be designed in such a way that they meet the real need (demand) of the people.

7.3.2 Conclusions on the current status of ICT sector development in the selected rural areas of Tanzania

The results on the current status of ICT sector development in the four rural districts involved in this study indicated that the "digital divide" still exists and is still a reality in the research areas reviewed, despite some efforts that are underway to bring ICTs to those communities. Compared to other districts in Tanzania, the four districts reviewed in this study are considered much more advanced in terms of ICTs development, as all of them had telecentres. The situation in other areas with no telecentres could be worse.

In terms of roads and other physical infrastructures, the findings of the study show that roads in three of the four districts involved in the study were in a terrible condition. This makes it difficult for farmers to transport their produce to markets outside the districts, even in cases where farmers are provided with information on the availability of those markets. From this observation, it can be concluded that the development of the ICT sector alone is not enough if other physical infrastructures such as roads are non-existing.

On the issue of radio and television, the data presented in the preceding chapters shows that in three of the four districts involved in this study respondents were not satisfied with the terrestrial television signals and radio signals from the radio and television stations broadcasting from urban areas. They complained that the signals were generally weak or non-available. Concomitantly, one can conclude that, apart from the new ICTs such as the internet,

traditional ICT services such as radio and television are far from being locally and uniformly available. It can be concluded that the urban–rural digital divide is still a reality in Tanzania.

There are great imbalances between urban and rural areas as far as ICT sector development is concerned. Rural areas have not been given the much-required attention as far as ICT sector development is concerned. The results show that there has been selective development of the sector in Tanzania, to the extent that in one district, Ngara mobile phone services were introduced ten years after the rest of the country received them. The ICT sector in Tanzania is characterised by little emphasis on the rural areas and the contribution of the sector to poverty reduction is greatly limited.

The findings of this study indicate that the majority of the people did not have access to electricity. In all the districts involved in the study, fewer than 10 percent of the population had access to electricity. Lack of electricity hinders large scale uptake of ICTs in rural areas. People were desperately in need of the services. A good case in point were the community members who sustain mobile phone use by re-charging their mobile phone batteries in public charging places located far away from where they live.

On the issue of a mobile phone service, the study concludes that, in spite of the significant improvements that have been made in terms of providing access to mobile phone services, this service is neither uniformly, nor easily, available in rural areas. In places where the services are available the quality of the service is an issue that need to be investigated.

Conclusions on the lack of basic infrastructure such as roads and electricity underscore the information chain model of Heeks (2002) mentioned in section 3.4.3.1 of Chapter Three. This indicates that resources are needed to help people act on the information. The information chain model highlights resources which are needed to come into play for effective functioning of the information chain. These are data resources, economic resources, social resources and action resources. According to the findings of the present research, in certain places farmers were provided with data resources, yet they lacked the economic resources such as road infrastructure and money to be able to act on the information.

The community radio in the Sengerema district sometimes announced price information for various agricultural products, yet most farmers could not act on the information because the roads going in and out of Sengerema were in such terrible condition that the farmers could not transport their produce. Economic resources such as telecommunication infrastructure, electricity, money to buy or access ICTs and skills to keep the technology working were direly inadequate. This inadequacy constituted a major access barrier.

Result given in the previous chapter indicated that none of the telecentres were providing telephone services to the public. In deed, none was selling air-time vouchers. Based on this result it can be concluded that basic telephone services were no longer the main or the basic services that are provided by the telecentres. Basic telephone services to the public in rural areas are currently dominated by mobile phones public service providers and local entrepreneurs, who set up small-scale telephone services.

Telecentres are faced with fierce competition, not only in the provision of basic telephone service, but also in other services such as basic office equipment services such as photocopying, typing, faxing and designing of business cards. In the past, rural ICT was a relatively new market, in which there was little competition. Many telecentres were the first ones to set up ICT services in the communities, giving them a first mover advantage. However, in many places this is no longer the case.

Telecentres are still important in many communities, especially in the provision of internet services. The emerging trend towards providing ISP services to the community by the telecentres shows that telecentres can do much more than just providing public access to the internet. It shows that they can act as a local hub and provide internet connectivity to other institutions in the community such as local government offices, hospitals, schools and NGOs. This enables telecentres to not only share their internet connection with the community but also to share the cost of the connection, thus making them much more sustainable.

Three out the four districts involved in this study had community radios. Community radios were found to play an important part in reporting local news and in strengthening the social fabric of the communities. However, lack of adequate, locally produced educational content is a problem that faces many community radio stations.

The findings of the study show that air-time vouchers were widely available in almost all the local shops of the districts. Respondents indicated that as one went further away from the district headquarters into the villages, the prices of the air-time voucher increased by at least 10%. It can be concluded that those in more remote locations and who have a critical need for communication and few resources have limited and more costly access to telecommunications services. These people are actually paying more for the service, yet in most cases they are of a poorer or compromised quality, compared to their urban counterparts, who enjoy a better quality of service at a lower cost.

7.3.3 Conclusions on policies to facilitate development and utilisation of ICTs in the selected rural areas of Tanzania

The results of this study show that there is a gap in ICT policy-making and implementation in Tanzania, because the then Ministry of Infrastructure Development did not play its policy-making function effectively. The lack of effective policy-making and implementation was mainly due to personnel's inadequate skills and capacity within the ministry. ICT leadership from the government, as it is represented by the Ministry of Infrastructure Development, is not sufficient to steer the ICTs sector development into a vibrant sector that can contribute positively to the country's socio-economic development. Delayed implementation of important policy objectives such as the universal access policy, and even the ICT policy itself, affects the development of the ICT sector in Tanzania.

Results of this study show that the new national fibre optic cable which the government is currently building will terminate in all the 26 district headquarters in Tanzania. This study concludes therefore that taking the fibre optic cable to the district headquarters only does not necessarily mean that the rural areas have been reached. It is a strategy in the right direction but it is not enough as far as rural access to ICTs is concerned. Only 10% of the people living in rural areas are actually living in the district headquarters. In some places villages are

located hundreds of kilometres from the district headquarters. Notwithstanding the significant contribution that the national ICT backbone cable will make in increasing rural access to ICTs, people living in the areas located far from the district headquarters, who are by far the majority, will still be un-reached. If infrastructure development in these areas is left to market forces alone they will face the same problem of being considered unprofitable by private service providers and might be left without access to ICT.

The researcher is aware of the complexity of the issue, given the current conditions of Tanzanian rural areas beyond the districts headquarters. With lack of electricity, roads, health service and other infrastructure, bringing ICT to these areas is a major challenge. The question that needs to be asked is how feasible is it to provide ICT infrastructure to all citizens, especially those in rural and very remote locations.

The results of this study indicated that, up until the time of this research, rural ICT provision in Tanzania had been supplied piecemeal and had a development project based approach. Because of this kind of approach, the diffusion of ICTs in rural areas had been selective, with some rural areas completely omitted. Rural areas have not been given the required emphasis in the functioning of both the regulator and the ministry. This is evidenced by the long time it took for the rural access fund to be availed, even among such indicators.

The interviewees said that high licence charges for telephone operators and other fees charged by the regulators are transferred to customers and make the services prohibitively expensive for the majority. This is indicative that the regulator is functioning more as a means of making money for the government in the form of collection of licensing fees and loyalty fees paid by the operators, rather than facilitating the spread of the technology. The report by Esselaar, Stavrou and O'Riordan (2004) cautioned that perceptions of the Tanzanian regulator as a revenue generator for the national treasury have limited local investment and consequently hindered the development of the sector. Other fees and taxes charged on ICTs are also transferred to the customers. In the mobile phone industry a study by GSM Association (2008) revealed that East Africans pay taxes of between 25% and 30% on mobile phone services, compared to an average of 17% across Africa.

The conclusions on policies and regulatory issues to facilitate development and utilisation of ICTs highlight the importance of enabling ICT policy and regulatory environment in the ICT sector, as suggested by the multiple stakeholder model of the Washington State University (WSU) (section 3.4.2). The WSU model underscores the role of multiple stakeholder groups in establishing the relationship between ICTs and poverty reduction, with clear emphasis on the importance of having effective regulatory regimes as a way of efficiently leveraging ICTs for development.

The Tanzanian policy and regulatory environment is not yet adequate in terms of underpinning the effective utilisation of ICTs for socio-economic development. The ICT policy and regulatory environment is facing challenges such as lack of capacity, and delayed implementation of important policy objectives and policies that lead to artificial increases in the cost of ICTs.

7.3.4 Conclusions on access to ICTs by people in the selected rural areas of Tanzania

The conclusion which can be drawn on access to ICTs by the people in the researched areas, on the basis of the results on access to the telecentre and its services, is that while the necessary conditions for access exist in all the telecentres involved in the study, sufficient conditions for access are still lacking, especially with regard to skills, awareness and affordability. In the case of mobile phones, results show that physical access to mobile phones were fairly high through individual ownership or borrowing from friends. There were many barriers to the effective use of the technology. Therefore, the access to telecentres and its services, the necessary conditions for access to mobile phone services existed in all the districts. However, sufficient conditions for mobile use were lacking, principally in terms of mobile phone battery charging, quality of services of mobile phone networks and skills to use mobile phones.

Results show that most people visit the telecentre to access internet services and use this communication for social reasons. It can be concluded that the use of the internet and other telecentre services in these communities is still very narrow. For some reason people cannot

apply internet use to other aspects of their lives, apart from emailing their friends and relatives. Though email communication is important to strengthen the social capital, the telecentre still needs to do more to raise awareness of the communities on the possibilities provided by the internet, besides mail.

7.3.5 Conclusions on use patterns of ICTs by people in the selected rural areas of Tanzania

Results on the information needs of the respondents were that, for the majority of the respondents, business-related information was the main information need. However, this kind of information was not provided in any of the telecentres visited, apart from the occasional broadcasting of such information by the Sengerema community radio. It can be concluded that all telecentres were not aware of the information needs of the communities they serve and therefore they were not in a position to meet such information needs.

Agriculture-related information was another main information need of the people in the communities in which this research was conducted. Only two telecentres, CROMABU and FADECO, of the four telecentres visited, had programmes which aimed at providing agricultural information to farmers. None of these services was available in Sengerema and Ngara telecentres.

These findings are in sharp contrast with the primary objective of the rural telecentres, namely to meet the information needs of farmers. It is the conclusion of this study therefore that most telecentres are not demand-driven. There are many unmet assumptions in the designing of the telecentres, which do not translate into meeting the information needs of the communities, given their real information needs. Agriculture is the key sector in the rural areas, judging by the large number of people that the agricultural sector employs in the rural areas (80% in Tanzania). A rural telecentre without programmes to reach farmers and meet their information needs is tantamount to a dire disservice. Indeed, a neglect of the farmers' information needs is not only unrealistic on the part of the rural telecentre but also a recipe for a failure in impacting the rural livelihoods and in reducing poverty. The agricultural sector is even more important now, because of the growing demand for food. The sector offers opportunities for producers to sustain and improve their livelihoods.

The findings of this study are that face-to-face communication and the radio were the major sources of information that the respondents used. From this it can be concluded that, even if provided with ICTs, the rural people will most likely continue to rely on face-to-face communication and probably the radio. The two sources are the most easily accessible to rural people and do not require complicated skills to use. On the use of the internet for pornography, the study concludes that there was lack of information, resources and appropriate policies for managing access to internet pornography by the telecentres.

7.3.6 Conclusion on the impact of ICTs use on various aspects of the rural livelihoods

This section will provide conclusions on the three capital assets which were analysed in this study in relation to ICTs. These are social capital, human capital and financial capital, as explained in the sustainable livelihoods framework in section 3.4.4 of Chapter Three.

7.3.6.1 ICTs and livelihoods: ICTs and social capital

The telecentres provided a number of benefits to the society such as facilitation of community interaction, knowledge-sharing and the creation of a savings and credit co-operative society. This was made possible by the utilisation of existing community assets such as trust, reciprocity and co-operation, shared values and norms. Through this, members of the community were able to come together and form a co-operative society, which helped them expand their financial capital. Social capital is one of the most important reasons why people use telecentre services.

In the case of mobile phones one may conclude that the easy and fast communication provided by the mobile phones helped people in the rural areas to communicate with friends and relatives, thereby provided a better means of following up for remittances (money send by relatives living elsewhere). The findings show that there was a high degree of sharing the mobile phone device for free with friends and family. This indicates that mobile phones were acting as a social tool, shared for social activities and communication. The mobile phone is seen more as a collective means of communication, as opposed to a personal communication

device. Mobile phones provided increased opportunities for community members to interact with each other and, in turn, stimulated a range of economic, social and civic activities.

The community radio had a positive effect on the social capital, because it helped community members to participate in social groups. This is because the radio provides a quick and easy means of advertising activities and meetings. Groups composed of women, the youth and credit unions facilitate social interactions in the village, thereby reinforcing the social capital of the society. The community radio helps to create community cohesion, as people help each other out in cases of emergences such as deaths and sicknesses, as they are quickly advertised over the radio.

7.3.6.2 ICTs and human capital

The internet was found to be important for information about education and available opportunities for further studies, as well as examination results for secondary school and college students. (see section 5.5.2 in Chapter Five). The internet was rarely used for the general acquisition of information on agriculture or any other general purposes. In some telecentres, seminars and workshops were organised by the telecentres, and people had opportunity to learn new ideas, especially agriculture-related. ICTs skills in terms of computer training provided by all the telecentres were found to be helping to extend the human capital and in giving people skills which enable them to get jobs and hence extend their financial capital as well. For business people, computer knowledge was found to have made their businesses more efficient. (see section 5.6.3 in Chapter Five).

Lack of the skills to use mobile phones was a problem to the majority of the people. This limited the extensive use of the technology in the rural areas. Many people in rural areas are not aware of the availability of customer care services and procedures to access this service is too complicated for them.

In the case of community radio, the results concerning the importance that respondents attach to the community radio suggests that local issues, local language and local knowledge is valuable to the community and not just international and national news. Content creation is

still a big problem for the community radio. The balance between locally produced education content and the content produced from outside is also sensitive to maintain.

7.3.6.3 ICTs and financial capital

Access to better markets and better prices mean better incomes for the farmer, ensuring food security and a means out of the vicious cycle of poverty and food insecurity. Unfortunately these services are very rare in rural areas. Only two telecentres had effective services to cater for this need. Marketing and price information provided by some telecentres enabled farmers to get fair prices for their products. Sometimes farmers were unable to take their produce to the markets, where they could fetch high prices, due to lack of resources for transportation. However, the pricing information empowered them and gave them more bargaining power over the business-middlemen who came to buy produce from them.

Up to the time of this research in Tanzania the advantages of the mobile phone in disseminating marketing information had not been fully exploited. Even though the Ministry of Industry, Trade and Marketing and Vodacom had launched SMS services to deliver market information through mobile phones to farmers in Tanzania, none of the farmers in the researched areas were using the services. There had been no impact evaluation of this initiative (Economic and Social Research Foundation 2007).

Most farmers said they normally called the middlemen in the urban areas to enquire about the prices of their produce on the urban market, before selling or transporting them. However, this alone is not enough to empower the farmers and provide them with information which they can use to effectively bargain with the middlemen. Molony (2006b) pointed out that the business relationships that exist between farmers and middlemen do not help the farmers. This is because the middlemen can use their position of power as a creditor to persuade a farmer to supply only to him or her and also to trust him or her on the price he or she says that the farmer's crop is sold for. In such a situation the farmer's exposure to prices offered by other buyers is restricted since the farmer must repay the creditor with his crop. Molony (2006b) suggested that the ability to communicate by mobile phone does not alter the trust relationship between the farmer and the middlemen. To get farmers out of this awkward real-world

business relationship, farmers need to be directly linked to market buyers by mobile phones or other ICTs.

On the issue of ICTs and diversified livelihoods, the conclusion which can be drawn, based on the findings of the study, is that, if provided with information, farmers are able to try out new livelihood strategies and adopt them, in combination with the existing ones. (see section 5.8.5.9 in Chapter Five). The diversification can be in terms of new, high-value agricultural crops or in terms of other non-agricultural activities.

In relation to vulnerability context, as illustrated in the sustainable livelihoods framework, the conclusion which can be drawn is that mobile phones play an important role during family emergencies such as health issues, injury and the death of a close relative. They are also beneficial in calling for help in cases of emergency. The findings of the study point to the fact that information provided through ICTs may not mitigate all the vulnerabilities that rural communities are facing. For instance, it is unlikely that ICTs would affect the fluctuating global commodity prices of the traditional cash crops such as cotton and coffee. However, the technologies provide people with information which helps them diversify their sources of income.

A general conclusion which can be drawn on the impact of the ICT on rural livelihoods is that ICTs are making some positive contributions to rural livelihoods. Their implications extend to economic issues, such as better earnings and saving money, social issues such as community interaction and knowledge sharing, better follow-up for remittances and creation of a savings and credit co-operative society. The implications extend to human issues such as ICTs literacy, improved farming techniques and information on new cash crops. The impact of the changes experienced may not be able to fully support and sustain socio-economic development in poor countries. Even so, ICTs are certainly having a positive influence on rural livelihoods.

7.3.7 Conclusion on the barriers to effective utilisation of ICTs in the selected rural areas of Tanzania

ICT use in rural areas is still faced with many barriers. These range from affordability to language problems and the lack of basic infrastructure such as electricity. Among other barriers, language was found to be a barrier to effective use and application of ICTs. The question is, how effective are the localised computer programs in helping people to learn and use computers? Another question is to what extent these programs have been marketed or at least been made known to potential users of such programs?

With regard to the issue of negative social capital and community radio, the study concludes that facilities such as the community radio have dual-use possibilities and they can be used to build up a community or tear it apart. The activities of community radios should be carefully monitored to make sure that they do not cause harm or social unrest to the communities they serve. A balance needs to be created to ensure that this monitoring does not interfere with the freedom of speech of the radios.

7.3.8 Overall conclusion about the research questions

As a general conclusion about the research question, this study establishes that some ICTs are beginning to help people in the rural areas and their livelihoods. However, these ICTs are not helping to their full potential because of three main limitations. These are illiteracy, lack of infrastructure and lack of skill to use the technology. Weakness in the policy and regulatory framework affect widespread availability of the technologies. ICTs cannot reach their full potential in impacting rural livelihoods, in view of the current circumstances in the rural areas of Tanzania; they can only help to a certain extent.

ICT sector development should go hand in hand with the development in other sectors such as the education sector, transport and energy. These sectors must grow together with the ICT sector for the ICTs to have an impact. The objective of the telecentres should be more tailored to the information needs of the farmers and those employed in the informal sector, as these are in the majority in rural areas.

7.4 RECOMMENDATIONS

The study identified various issues which affect effective utilisation of ICTs for sustainable rural livelihoods in the selected rural areas of Tanzania, as expressed by community members, telecentre managers and policy-makers. The study therefore makes recommendations to address the specific ICT issues identified in the study which affected rural livelihoods. The recommendations address each of the study objectives.

7.4.1 Recommendations on the characteristics of rural ICT users

ICT project initiators need to be aware of the barriers that hinder the majority, especially farmers, from using telecentres and other ICT services. Efforts should be made to expand the benefit of the technologies to the majority of the Tanzanian population who are poor and based in rural areas. Failure to do this will mean that very few people will benefit from the ICTs. Creative use of the new and old ICTs, such as the convergence between the internet and community radio, is needed to make sure that the development-related information reaches every one. Combining new ICTs with old technologies and traditional means of sharing information, such as oral communication, is needed. This can be done by converging new technologies with the old ones, e.g. printing and story-telling.

Telecentres should re-design programmes to bring the under-represented groups such as farmers back to the centre of their projects, rather than treating them as passive receivers of ICT services. The telecentre management have to make sure that illiterate and poor people in the community have the minimum functionality with computers and the internet. Special kinds of training programmes need to be organised for this group of people.

Telecentres should avoid becoming like internet cafés. Telecentres should provide more ‘respectable’ or value added services such as educational, health, e-government and agriculture-related information. Telecentre staff should assist users who have insufficient skill to use computers.

In terms of mobile phones, there is a need to develop services that are nuanced towards the real needs of the rural people and incorporate them into the mobile phone technology. Thanks to services such as 'call me services', mobile phone credit transfer services and mobile banking are really making an impact on the rural poor people.

7.4.2 Recommendations on the current status of ICT sector development in the selected rural areas of Tanzania

The Tanzanian government needs to adopt a holistic rural development approach, in which all sectors are capacitated in order for ICTs to make a meaningful impact. On the issue of radio and television, this study recommends that more emphasis is needed in rural areas, not just for the new ICT infrastructure, but also for the old ones such as radio and television. The study also recommends that universal access policies involve other old ICTs. Otherwise as it is now, rural people who also have less resources end up paying too much for basic communication services as in the case of satellite television and radio. The study recommends that universal access should go hand in hand with rural electrification efforts.

On the issue of access and quality of mobile phone services, the study recommends that the regulator needs to ensure widespread availability of mobile phone services, especially in rural areas. The current convergence licensing regime (refer to section 2.3.1.4 in Chapter Two) allows many operators to enter the market, but there are no guarantees that all of them will cover the rural areas effectively. The quality of service, especially in rural areas, should be monitored closely.

On the issue of competition against telecentres by local entrepreneurs, this study recommends that, to ensure their survival, telecentres should migrate to other value added services. Failure to do this would end in telecentres being rendered useless on account of the competition from local entrepreneurs, who provide public mobile phone services, secretarial shops and even internet cafés in the same regions. Telecentres should concentrate on services such as making topical content in areas of agriculture, social welfare, education, health and environment accessible to the rural population, rather than duplicating services offered by internet cafés. Continuous improvement and renewal of telecentre services is necessary to ensure their

survival (Tan 2007). Mayanja (2003) recommended that the staff of the community telecentres must prepare themselves to deal with competition in the provision of ICT services. Mayanja (2003) adds that it does not have to be a problem if a community telecentre prepares for such competition. The community telecentres will have to define a unique service profile that makes them stand out from the competitors. Telecentres should reach out to new and more rural areas where ICT services are not available.

On the issue of telecentres operating as a local ISP, this study recommends that the technological and economic aspects of this phenomenon need to be explored further. Apparently, telecentres which were sharing their bandwidth/connectivity were doing so via Local Area Networks (LANs) or wireless. Questions which need to be examined in the future, as recommended by Nasikye (2007), are:

- What equipment is needed to share telecentre connectivity for cabled Local Area Networks (LAN) and for Wireless LAN?
- Up to what geographical location can one share the connectivity?
- If a telecentre is planning to share connectivity, what procedures/steps does it need to go through?
- How is a telecentre acting as a wholesaler different from an ISP?
- Are there any difference in the tariff structure for a telecentre, telecentre-wholesaler and ISP?
- What are the infrastructure needs of the telecentre whole sellers and the ISPs and the estimated cost?
- Is the billing system based on data usage or bandwidth?

More research needs to be done on community radios and their convergence with telecentres. Collaboration of these radios and academic institutions, such as the audio visual unit of the Sokoine University of Agriculture (SUA), is needed to create content. On the issue of the cost of ICT services in remote and rural areas, this study recommends that the regulator, together with the TCRA consumer consultative committee, needs to ensure that prices are the same in urban and rural areas.

7.4.3 Recommendations on policies to facilitate development and utilisation of ICTs in the selected rural areas of Tanzania

On the issue of lack of capacity within the ministry responsible for ICTs in Tanzania, this study notes that capacity-building is important not only in the regulatory authorities but also in the ministries responsible for ICTs and other institutions involved with ICTs. Government ministries responsible for ICTs should have staff with a good blend of skills who are "doers" (Schware 2003). The whole issue of ICT leadership from the government needs to be taken seriously, to make ICTs an enabler of socio-economic development in the country. Tongia (2006) presented an analysis of some of the causes of poor connectivity in developing countries. Based on a techno-economic analysis and design, Tongia's (2006) study showed that technical limitations *per se* are not the bottleneck for widespread connectivity; rather, design, policy and regulatory challenges dominate.

On the issue of delayed implementation of important policy objectives in the ICT sector, this study recommends that the government should ensure that the implementation strategy for the policy is completed and made an official document for its effective implementation by all stakeholders. Schware (2003) pointed out that in the ICT sector, technology is changing rapidly. Therefore achieving practical progress, in both the short and the long term, is more important than having a perfect vision that may take many years to achieve. Some short-term practical achievements demonstrate progress and establish credibility.

The government need introduce other strategies which will expand the ICT infrastructure further into the rural areas beyond the district headquarters. Emphasis by the regulator and the ministry should be geared towards the rural areas. There is a need for more co-ordination in the IT sector development in rural areas. There is also a need for a more unified way of building a chain of telecentres or other forms of rural ICT access points.

Government and regulatory policies which cause distortion in access costs, resulting in artificial increases in the cost of connectivity (or other ICT), should be avoided. Reduction in taxes and other licensing compliance conditions, including licensing fees, would lead to a reduction in tariffs, which would then boost usage of mobile services.

7.4.4 Recommendations on access to ICTs by people in the selected rural areas of Tanzania

Telecentre managers need to be aware of the different aspect of access for them to go beyond the provision of physical access to ICTs. Roman and Colle (2002) stressed that without recognising the various dimensions of access telecentres, the telecentres will not be able to justify their existence, nor become demand-driven. National universal access policies need to address the wider perspective of access and not just physical access. Unfortunately, even the universal access policies, such as the one Tanzania has, do not necessarily cover all the aspects of access, beyond providing physical access. The study recommends that the quality of mobile phone services, especially in rural areas, be brought to the attention of the regulator and of the consumer consultative committee of the TCRA.

On the issue of awareness, this study recommends that the telecentres should raise awareness, not only of the available resources, but also of the use of ICTs and how they can help people in their day-to-day lives. It is important to raise awareness about information and ICTs as a valuable resource for individuals, families, organisations and communities (Roman and Colle 2002). By so doing, the telecentres could stimulate demand for their services. Munyua (2000) emphasised that creating awareness, training and capacity-building must be an integral part of all ICT projects, so as to create and maintain the critical mass of users needed to sustain the project.

7.4.5 Recommendations on use patterns of ICTs by people in the selected rural areas of Tanzania

One of the most difficult, yet necessary, activities in the provision of community information is the assessment of information needs. The telecentres, or other information systems developed or adopted to serve the people, must meet the needs of the people intended to be served. This can be done by conducting regular information needs assessment.

In order for the rural telecentres to have an impact on rural communities, meeting the livelihood information needs of these communities should be made the objective of the telecentres. The telecentres have a unique opportunity to help the communities in rural areas

meet their information needs. This can be done by designing information services that target the various aspects of the agricultural sector, such as crop production, pest management and marketing. ICT can make a contribution to the agricultural sector by increasing the efficiency, productivity and sustainability of small-scale farms. Mwathi (2008) warned that farming involves risks and uncertainties. Farmers face many threats from poor soils, drought, erosion, diseases and pests. Key improvements stem from basic information about pest and disease control, early warning systems, weather changes, new varieties, ways to optimise production and regulations and quality control. Telecentres should provide information on other topics such as education, health and government-related information.

Computer-based sources of information should be converged with the sources of information that respondents use most. In this study the two sources that respondents indicated that they use the most were person-to-person communication (verbal communication) and the radio. The potential that the community radio station has in meeting the information needs of the communities, when used alongside telecentres, cannot be over-emphasised. Creative ways of combining the two need to be worked out. Content creation/programming for the purposes of educating the communities also needs attention.

The issue of internet pornography in telecentres needs to be properly addressed, in order to preserve the credibility of telecentres and avoid the negative effects that telecentre operations may cause to the communities they serve. With the increase and ease of access to pornography on the internet, telecentres managers need to take action to prevent any negativity from exposure to such content especially to children. Telecentre managers should formulate policies or content filtering-solutions that can be integrated into the operations of telecentres. Such policies can even include penalties, in the form of fines to perpetrators, as recommended by some of the community members in this study. Where necessary, content-filtering mechanisms should be adopted. Laughton and Rensleigh (2007) recommended two approaches for managing access to pornography in an online environment. These are active approach which consists of mechanisms (such as content-filtering solution) that physically restricts users from viewing content outlined as unacceptable and passive approach in the form of a policy, that may condemn such behaviour.

7.4.6 Recommendations on the impact of ICTs use on various aspects of rural livelihoods

This section will provide recommendations on the three capital assets which were analysed in this study. They are social capital, human capital and financial capital.

7.4.6.1 ICTs and social capital

On the relationship between telecentre services and social capital, this study recommends that telecentres should capitalise on building the social capital for the community. This will help in terms of sustainability of the telecentres. Simpson (2005) revealed that social capital is important for effective implementation, widespread uptake, greater social inclusion and sustainability of ICT initiatives. On mobile phone and social capital, therefore, the present study recommends that access to mobile phones be expanded and that the social capital created by them needs be expanded to other productive/beneficial resources.

On community radio and social capital, the study recommends that the policy and regulatory environment should be more enabling if community radio services are to increase in Tanzania. The Tanzania Communications Regulatory Authority (TCRA) is proposing to decrease the licensing fees for community radios and televisions from over US$ 2500 to US$ 200-300. This is good news for communities that want to start their own radio stations. However, the licensing process and procedures also need to be friendlier and less cumbersome for the applicants. Though the regulator has significantly reduced the cost of the community radio licences the sector is still faced with other challenges. It is still expensive to run the radio stations, in terms of the cost of developing relevant local content (need skills, equipment, resources). Other expenses are the cost of the community radio equipment, the cost of the air-time and running studios on fuel power generators, as there is no electricity in rural areas.

7.4.6.2 ICTs and human capital

In the case of mobile phones and human capital, this study recommends that mobile phone customer care services should be more sensitive to rural customers who, in most cases, need much more help and attention than their urban counterparts. Mobile phone campaigns and promotions targeted at the rural areas should include educational components to educate the

rural users on how to use their devices effectively. The current procedure for accessing customer care services for mobile phone services are normally long and too complicated for semi-illiterate people and those who are struggling with the use of the technology. Direct toll-free numbers should be provided, instead, especially for rural customers.

Programme content is the common and major concern of community radio station presenters. Local communities need assistance from government, local government and donor agencies on how to produce educational and locally produced content. Community radio staff should be trained on the application of methodologies for integrating educational messages into entertainment formats, which is also known as Edu–ttainment content. The use of local languages in community broadcasting should be encouraged. At the moment, in Tanzania, community radio is meant to broadcast only in the national language, Swahili. This is one of the conditions of acquiring a licence to run a community radio in Tanzania. Therefore, legally, the radios are prohibited from using local languages, which are better understood by the particular communities. The people who do not speak Swahili in the community are therefore excluded.

7.4.6.3 ICTs and financial capital

The provision of marketing information to farmers is one of the telecentre services which have the potential to produce immediate positive impact on the financial capital and improve the livelihood of rural people. Telecentres should be more active on this. Marketing information can be made accessible to farmers via the mobile phone. This can be achieved through partnerships between telecentre, NGOs and mobile phone companies.

7.4.7 Recommendations on the barriers to effective utilisation of ICTs in the selected rural areas of Tanzania

On the issue of language barriers, this study recommends that more research be done to establish the effectiveness of the localised programs in helping people to learn to use the computer. Co-ordination is needed between developers of these programmes and people working in rural ICTs and telecentres. There is a need for the marketing of these programs so that they may be known by their potential users. As Apikul (2006) observed, in order to encourage the use of localised software they have to be aimed at and packaged for the end-users.

The study recommends that telecentre staff should develop a mindset that is much more customer-focused. Telecentre staff should treat the most disadvantaged members of their communities as their most valued customers and try to understand their needs. This is because these are the kind of customers that face the barriers to the use of ICTs the most. Failure to do this could limit telecentres to benefiting only the middle class professionals and alienating the poor and the illiterate in the community.

With regard to the issue of negative social capital and community radio, the study recommends that the technology be used responsibly by all involved, for example owners and managers of radio stations and presenters. There is also a need to have strict codes that require all radio stations to promote national cohesion and eschew any ethnic/sexist/religious/racist hate speeches or agendas.

7.5 A new proposed tripartite ICT for development model

In order to fulfil the last objective of this study, that is to recommend a model for effective implementation of ICTs and their use for sustainable livelihoods in the selected rural areas of Tanzania, this section presents a proposed tripartite ICT for development model. The model is based on ideas extracted from various models which guided the present study, as presented in section 3.2 of Chapter Three. The proposed tripartite ICT for development model is based on the empirical findings of this study.

Despite the development of the various models attributing ICTs to economic development and poverty alleviation (as presented in section 3.2 of Chapter Three), over half of the world's population does not at present have access to even a telephone or the internet and a fifth of the world's population still live in abject poverty. Does it mean that these models are irrelevant to the developing world? Do the models offer a piece-meal approach to how ICTs may be exploited to reduce poverty in the developing world? One is tempted to answer these questions in the affirmative, because none of the models discussed in section 3.2 of Chapter Three in their own right give an effective framework that may be used to establish the connection between ICTs and economic development. The models have not been effective because they have certain deficiencies.

This is not to say that the models have not made a significant contribution to consideration of the connection between ICTs and poverty reduction. Indeed, the models form a significant building block for anyone who is interested in the implications of ICTs for socio-economic development. All the models discussed in section 3.2 of Chapter Three provide very valuable and important factors that need to be taken into consideration in explaining the relationship between ICTs and development.

In that regard, the tripartite ICT for development model (see Figure 7.1) that is suggested in this study is a result of ideas distilled from the UNDP model, the multiple stakeholder model of the Washington State University, the onion-ring model, pull and push model, information chain model and sustainable livelihoods framework discussed in section 3.2 of Chapter Three. The UNDP model emphasises the positive role of the application of ICTs for development and poverty-reduction purposes and the WSU model underscores the role of multiple stakeholder groups in establishing the relationship between ICTs and poverty reduction, with clear emphasis on the importance of having effective regulatory regimes as a way of efficiently leveraging ICTs for development. The three models by Heeks (2005a) show up the weaknesses of the rather simplistic and deterministic view of the role of ICTs for development and poverty reduction. Heeks' (2005) models point to other crucial factors that need to be taken into account before ICTs can play an effective role in development and poverty reduction.

The sustainable livelihoods framework provides a base for understanding ways in which ICTs contribute to various aspects of livelihoods of the people, such as human capital, building relationships for communication and information-sharing and strengthening the financial capital. The framework may be applied either during planning new ICT based initiatives or in assessing the contribution to livelihood sustainability made by existing ICT initiatives.

By blending ideas from the previously discussed models, the proposed model (see Figure 7.1) aims at explaining the relationship between ICTs and development from a more holistic point of view. In other words, the proposed model combines ideas from the selected models to formulate a tripartite ICT for development framework that includes the best of all the

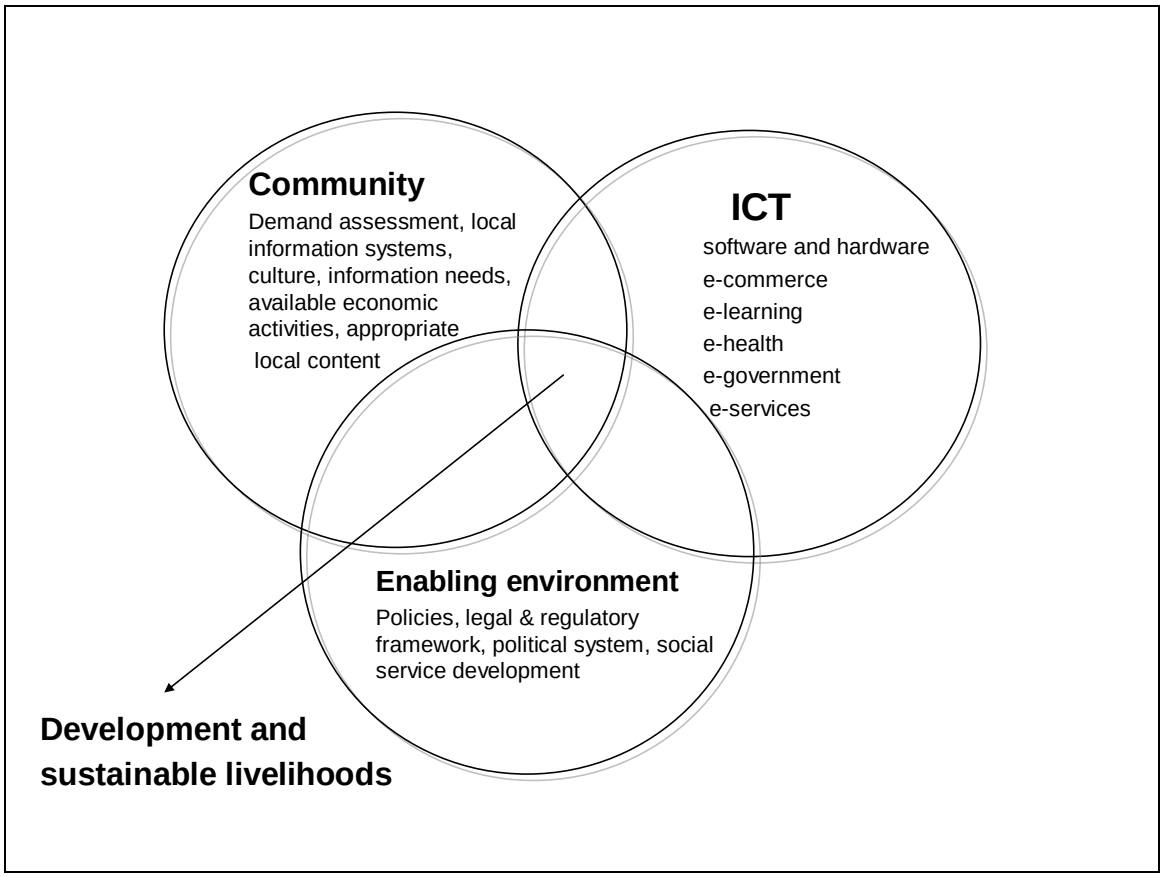
discussed models.

The tripartite ICT for development model proposes that the potential power of ICTs for socio-economic development, as explained by the UNDP model, and other related perspectives on the role of ICTs for poverty reduction should be conceptualised within the context of the targeted community. The community is the intended beneficiary of digital access. Therefore, its demands, needs and environment must be understood, including the available non-digital information systems. The focus should be on information rather than on ICTs alone. After understanding the community, it is important to determine how ICTs can be used to meet community needs and enhance the flow of information in the community. That will ensure that supply meets demand. The empirical evidence of this study supports this fact.

The proposed model suggests that the focus should not be just on new ICTs, but other old technologies like radio, and television and the way these technologies play a part in poverty reduction should also be taken into consideration.

Last but not least, for the technology and the community to work in harmony there has to be an enabling environment in terms of appropriate policies, legal and regulatory frameworks and political environment, appropriate locally developed content and the necessary social services such as health services and schools. Such a framework is likely to facilitate the use of ICTs for poverty reduction.

Figure 7.1 Proposed tripartite ICT for development model



Although the suggested model is proposed as one of the ways of understanding the connection between ICTs and socio-economic development, the way forward would be to test the model and conduct base-line studies focusing on demand-side analysis, as opposed to supply-side approach to the ICT sector. The suggested model cannot demonstrate the relationship between ICTs and poverty reduction in a quantitative manner. Building on this qualitative model, further research may be conducted to establish quantifiable variables that may make the suggested model more robust than the present case.

7.6 Suggestions for further research

The present study investigated the link between ICTs and sustainable livelihoods in the selected rural areas of Tanzania. The study identified several issues which could be the

subject of further investigation by other researchers in the field. The following discussion highlights some of the areas that require investigation by future researchers.

It is recommended that studies be conducted to establish the convergence between community radio stations and telecentres and the usefulness of community radio to the communities. Such a study is timely, given the emphasis that community radios have been given in the operations of telecentres.

The current study investigated the link between ICT and sustainable livelihoods using ICT services provided by telecentres and mobile phone services. It is recommended that an exploratory study be conducted to establish the suitability for Tanzania for other ICT ventures which can benefit the country and contribute to socio-economic development. Examples of these ventures are call centre businesses and Business Processes Outsourcing (BPO).

The present study established that mobile phones were considered an important tool for communication in all the rural areas involved in this research. It is recommended that research be conducted on new mobile phone services such as mobile banking and mobile phone money transfer services, to establish how these services benefit the farmers and people living in rural areas.

In investigating the use of ICTs for socio-economic development and sustainable livelihoods, this study was confined to rural areas with telecentres only, which in most cases were district headquarters. It is recommended that studies be conducted in rural areas located remotely, and far away from the district headquarters, in order to obtain a complete picture of the status of development and use of ICTs in rural areas of Tanzania. Some features of the district headquarters, such as availability of electricity supply and varied economic activities, may not be available in areas located in remote areas far away from the district headquarters. These features might give a different trend in the use of ICTs such as mobile phones.

Research on the spending behaviour of households with mobile phones in the rural areas

of Tanzania would also be beneficial. Such a study will help to establish whether or not household spending on mobile phone handsets and air time affect the availability of other needs of the households, such as food and sanitation. This kind of study will also establish whether or not such a substitution affects the well-being of the household members.

It is further recommended that studies be conducted on policy and regulatory issues as they relate to universal access policies in Tanzania. Other areas which need to be researched are the sustainability of the telecentres and usage of localised Swahili computer programs in the targeted populations. Research on the role of telecentres on other ICT applications such as e-government, e-health and e-learning would also be beneficial.

The intention of this study was to examine the relationship between ICTs and sustainable livelihoods in selected rural areas of Tanzania**,** taking into consideration local conditions and realities. Its purpose, to investigate how, and for what purposes, ICTs are used by people in the selected rural areas of Tanzania and the effects that ICTs have on various aspects of their livelihoods, has been achieved. Areas for further research have been identified.

REFERENCES

Abbreviations of references used

AISI	see	African Information Society Initiative
APC	see	Association for Progressive Communication
BBC	see	British Broadcasting Company
CINSA	see	Community Information Network for Southern Africa
CIT	see	Critical Incident Techniques
DFID	see	Department for International Development
DOT Force	see	Digital Opportunity Task Force
GICT	see	Global Information and Communication Technology
GKP	see	Global Knowledge Partnership
HIPC	see	Highly Indebted Poor Countries Initiative
ICTs	see	Information and Communication Technologies
IDRC	see	International Development Research Centre
IFAD	see	International Fund for Agricultural Development
IFIs	see	International Financial Institutions
ILFS	see	Integrated Labour Force Survey
IMF	see	International Monetary Fund
InfoDev	see	Information for Development Programme
ITU	see	International Telecommunication Union
MDG	see	Millennium Development Goals
NGO	see	Non-Governmental Organisation
NSGRP	see	National Strategy for Growth and Reduction of Poverty
OECD	see	Organisation for Economic Co-operation and Development
PRSP	see	Poverty Reduction Strategy Paper
SCECSAL	see	Standing Conference of Eastern, Central and Southern African Library and Information Association
SDC	see	Swiss Agency for Development and Co-operation
SIDA	see	Swedish International Development Co-operation Agency
SME	see	Small and Medium Enterprises
TAFOSSA	see	Tanzania Free and Open Source Software Association
TCC	see	Tanzania Communication Commission
TCRA	see	Tanzania Communication and Regulatory Authority
UNDP	see	United Nations Development Programme
UNESCO	see	United Nations Educational, Scientific and Cultural Organisation
UNFPA	see	United Nations Population Fund
URT	see	United Republic of Tanzania
WSIS	see	World Summit on Information Society

About, Inc. 2006. Map of Tanzania.
<http://geography.about.com/library/cia/blctanzania.htm>
(Accessed 12 March 2006).

Adam, L. 2005. National ICT policies making in Africa: implications for CSOs. <http://www.ssrc.org/programs/itic/publications/knowledge_report/memos/adammemo4.pdf>(Accessed 20 February 2006).

Adeya, C. N. and Cogburn, D. L. 2001. Globalisation and the information economy: challenges and opportunities for Africa. In Nulens, G., Hafkin, N., Leo, V.A. and Bart, C. (eds).*The digital divide in developing countries: Towards an information society in Africa*. Brussels: VUB University Press.

Adonis, A. 1994. Survey of mobile communications: lines that point to cellular growth. *The Financial Times*, 5 September: 1.

Afemann, U. 2000. Internet and developing countries: pros and cons. <http://www.home.uniosnabrueck.de/uafemann/Internet_Und_Dritte_Welt/Malaysia/InternetProsandCons.htm> (Accessed 03 April 2008).

Africa Information Society Initiative (AISI). 2003. An action framework to build Africa's information and communication infrastructure. Addis Ababa: United Nations Economic Commission for Africa (UNECA). <http://www.uneca.org/aisi/> (Accessed 18 February 2006).

Africa Media development initiative. 2005. Television. <http://downloads.bbc.co.uk/worldservice/trust/pdf/AMDI/ethiopia/amdi_ethiopia6_television.pdf> (Accessed 20 February 2008).

Afrol news. 2006. Mobile phones to empower rural Rwanda. <http://www.afrol.com/articles/20055> (Accessed 18 October 2006).

Álvarez, R. and Calás, M. B. 1996. The global data highway: for whom a freeway? for whom a toll road? In Roche, E. M. and Blaine, M. J. (eds). *Information technology, development and policy: theoretical perspectives and practical challenges.* Aldershot: Ashgate. pp. 27- 44.

Anfara, A. V. and Mertz, T. N. (eds). 2006. *Theoretical frameworks in qualitative research.* Thousand Oaks: Sage Publications Inc.

Apikul, C. 2006. Localising Free and Open Source Software - Translate.org.za, South Africa**.<**http://www.iosn.net/l10n/projects/other/translateza/> (Accessed 29 August 2008).

Archer, C. 1992. *International organisations.* 2nd ed. London: Routledge.

Arun, S., Heeks, R. and Morgan, S. 2004. Researching ICT-based enterprise for women in developing countries: a livelihoods perspective. <http://www.womenictenterprise.org> (Accessed 27 June 2004).

Ashley, C. and Carney, D. 1999. *Sustainable livelihoods: lessons from early experience.* London: DFID.

Association for Progressive Communication (APC). 2007. Fibre for Africa: opening up affordable bandwidth in Africa. <http://fibreforafrica.net/index.shtml> (Accessed 29 June 2007).

Audet, J. and d'Amboise, G. 2001. The multi-site study: an innovative research methodology. *The Qualitative Report*, 6(2). <http://www.nova.edu/ssss/QR/QR6-2/audet.html>(Accessed 20 September 2005).

Babbie, E. 2002. *The basics of social research*. 2nd ed. Belmont, CA: Wardsworth.

Babbie, E. 2004. *The practice of social research*. 10th ed. Wadsworth: Thomson.

Babbie, E. and Mouton, J. 2001. *The practice of social research*. (South African edition). Cape Town: Oxford University Press Southern Africa.

Bailey, D. 2006. The effect of the localisation of FOSS in a sophisticated developing world economy. <http://www.localisation.ie/resources/conferences/2006/presentations/DwayneBailey/translate-l10n-lrc.pps.> (Accessed 02 September 2008).

Barbour, R. 2008. *Introducing qualitative research: a student guide to the craft of doing qualitative research*. Los Angeles: Sage Publications.

Barbour, R. S. and Kitzinger, J. 1999. *Developing focus group research: politics, theory and practice.* London: Sage Publications.

Barnes, D.F. 1997. Tackling the rural energy problem in developing countries. *Finance and Development* 34 (2): 1-15.

Bayes, A., von Braun, J. and Akhter, R. 1999. Village pay phones and poverty reduction: insights from a Grameen Bank initiative in Bangladesh. <http://www.telecommons.com/villagephone/Bayes99.pdf> (Accessed 18 October 2006).

Behling, O. and Law, K. S. 2000. Translating questionnaire and other research instruments: problems and solutions. Thousand Oaks: Sage Publication.

Belkin, N. J. 1980. Anomalous states of knowledge as a basis for information retrieval. Canadian Journal of Information Science 5: 133–143.

Benjamin, P. 2000. Telecentre 2000 literature review. <http://www.communitysa.org.za/tele2000.htm.> (Accessed 12 January 2004).

Benjamin, P. 2001a. African experience with telecentres. <http://www.isoc.org/oti/articles/1100/benjamine> (Accessed 10 October 2005).

Benjamin, P. 2001b. Does 'telecentre' mean the centre is far away? telecentre development in South Africa. *The Southern African Journal of Information and Communication* 1(1).

Benjamin, P. 2001c. The Gaseleka telecentre, Northern Province, South Africa. In Latchem, C. and Walker, D. (eds). *Telecentres: case studies and key issues*. Vancouver: The Commonwealth of Learning. pp. 75-84.

Benjamin, P. and Dahms, M. 1999. Background paper on universal service and universal access issues. <http://cbdd.wsu.edu/edev/edp/benjamin-dahms-1999.pdf> (Accessed 10 October 2005).

Bernard, H. 2000. *Social research methods: qualitative and quantitative approaches*. Thousand Oaks. Sage Publications.

Bernhardson, L. 1998. Telecentre case study: Sweden. In Fuchs, R.P. (ed.) *Case histories from the global telecentre movement.* <http://www.crdi.ca/en/ev-10632-201-1-DO_TOPIC.html> (Accessed 12 April 2008).

Bjørn, F. and Stein, K. 2007. A rural-urban digital divide? regional aspects of internet use in Tanzania. *Proceedings of the 9th International Conference on Social Implications of Computers in Developing Countries, São Paulo, Brazil.* <http://www.ifipwg94.org.br/fullpapers/R0090-1.pdf> (Accessed 12 May 2008).

Blaxter, L., Hughes, C. and Tight, M. 2001. *How to research*. 2nd ed. Buckingham: Open University.

Bless, C. and Higson-Smith, C. 2000. *Fundamentals of social research methods: an*

African perspective. 3rd ed. Cape Town: Juta Publication.
Bloor, M., Frankland, J., Thomas, M. and Robson, K. 2001. *Focus groups in social research: introducing qualitative methods.* London: Sage Publications.
Bohlin, E., Brodin, K., Lundgren, A. and Thorngren, B. 2000. *Convergence in communications and beyond.* Amsterdam: Elsevier.
Bridges. org. 2003. Spanning the digital divide: understanding and tackling the issues. Washington DC: Bridges.org. < http://www.bridges.org/spanning/report.html> (Accessed 12 May 2005).
British Broadcasting Company (BBC). 1999. The sound of hatred. <http://www.hartford-hwp.com/archives/35/179.html>(Accessed 17 May 2006).
BBC. 2005. Mobile growth 'fastest in Africa'. <http://news.bbc.co.uk/1/hi/business/4331863.stm> (Accessed 26 April 2006).
BBC. 2008. Kenyan local radio faces closure. <http://news.bbc.co.uk/1/hi/world/africa/7475327.stm>(Accessed 29 August 2008).
Britt, D. W.1997. *A conceptual introduction to modelling: qualitative and quantitative perspectives*. Mahwah: Erlbaum.
Britz, J. J. 2004. To know or not to know: a moral reflection on information poverty. *Journal of Information Science* 30 (3): 192-204.
Bruntland, G. (ed.) 1987. *Our common future: world commission on environment and development*. Oxford: Oxford University Press.
Bryman, A. 1988. *Quality and quantity in social research*. London: Unwin Hyman.
Bryman, A. 2004. *Social research methods*. 2nd ed. New York: Oxford University Press.
Burbules, N. C. and Callister, J. T. A. 2000. *Watch IT: the risks and promises of information technologies for education*. Colorado: Westview Press.
Buré, C. 2007. Reinventing community radio: how does it work with telecentres?" <http://www.digitaldivide.net/blog/claire.bure> (Accessed 12 May 2008).
Burke, J. and Kirk, A. 2001. Ethnographic methods. <http://www.otal.umd.edu/hci-rm/ethno.html> (Accessed 18 February 2006).
Burrows, T. 2003. Mobile key to African telecoms growth. <http://www.itweb.co.za/sections/telecoms/2003/0310131006.asp?A=AFN&S=All%20Africa%20News&O=FPT> (Accessed 26 April 2006).
Burton, D. 2000. Data collection issues in survey. In Burton, D. (ed.) *Research training for social scientists: a handbook for postgraduate researchers*. London: Sage. pp. 320-334.
Burton, S. 2003. Rethinking the interface: the limits and possibilities of communication for development. PhD Thesis. Pietermaritzburg: University of KwaZulu-Natal.
Busha, C. and Harter, C. 1981. *Research methods in librarianship: techniques and interpretation*. San Diego: Academic Press.
Campbell, D. T. and Fiske, D. W. 1959. Convergent and discriminant validation by the multitrait – multimethod matrix. *Psychological Bulletin* 56: 81-105.
Cano, V. 2005. Reliability and validity in qualitative research. <http://www.qmuc.ac.uk/psych/RTrek/study_notes/web/sn5.htm> (Accessed 02 September 2005).
Carney, D. (ed.) 1998. *Sustainable rural livelihoods: what contributions can we make*? London: DFID.
Carvin, A. 2005. Telecentres: WSIS Papers Newsletter - July 2005 No. 9 - Telecentres: a

new model for social appropriation of ICTs. <http://wsispaper.choike.org> (Accessed 20 May 2008).

Case, D. 2002. *Looking for information: a survey of research on information seeking, needs and behaviour*. Amsterdam: Academic Press.

Castells, M. 1996. *The information age: economy, society and culture, volume 1: the rise of network society*. Oxford: Blackwell Publishers.

Castells, M. 1998. *The information age: economy, society and culture, volume 3: end of millennium*. Oxford: Blackwell Publishers.

Castells, M., Fernandez-Ardevol, M., Qiu, J. L. and Sey, A. 2006. *Mobile communication and society: a global perspective.* Massachusetts: Massachusetts Institute of Technology (MIT) Press.

Cecchini, S. and Scott, C. 2005. Can information and communication technology applications contribute to poverty reduction? lessons from rural India *Information Technology for Development* 10(2): 73-84.

Chachage, B. 2001. Internet cafés in Tanzania: a study of the knowledge and skills of end users. *Information Development* 17 (4): 226-227.

Chacko, J. G. 2004. Paradise lost? reinstating the human development agenda in ICT policies and strategies. *Information Technology for Development* 11(1): 97-99.

Chailla, A. M. 2001. Implementation of policies and strategies for agriculture information access and use in Tanzania. PhD Thesis. Pietermaritzburg: University of Natal.

Chambers, R. and Conway, G. R. 1992. *Sustainable rural livelihoods: practical concepts for the 21st century*. Institute for Development Studies (IDS): Sussex. UK.

Chanzi, S. R. 2002. E-mail over HF radio. <http://www.stonepower.se/Images/WINO_ICT.pdf> (Accessed 26 June 2006).

Chapman, R. and Slaymaker, T. 2002. ICTs and rural development: review of literature, current interventions and opportunities for action. Working Paper 192. London: Overseas Development Institute. <http://www.odi.org.uk/publications/working_papers/wp192.pdf> (Accessed 10 October 2005).

Chapman, R., Slaymaker, T. and Young, J. 2005. Livelihoods approaches to information and communication in support of rural poverty elimination and food security. <http://www.odi.Torg.uk/rapid/Publications/Documents/SPISSL_WP_Complete.pdf> (Accessed 20 October 2005).

Chipchase, J. 2008. Understanding non-literacy as a barrier to mobile phone communication. <http://www.kiwanja.net/database/document/report_non-literacy_mobiles.pdf > (Accessed 02 September 2008).

Chowdhury, N. 2000. Information and communication technologies and IFPRI's mandate. Washington, DC: International Food Policy Research Institute. <http://www.ifpri.org/divs/cd/dp/ictdp01.pdf.> (Accessed 18 May 2006).

Clement, A. and Shade, L. R. 2000. The access rainbow: conceptualising universal access to the information/communication infrastructure. In Gurstein, M. (ed.) Community *informatics: enabling communities with information and communication technologies*. London: Idea Group. pp. 31-51.

Cohen, L., Manion, L. and Morrison, K. 2000. *Research methods in education*. 5th ed. London: Routledge Falmer.

Cohen, L., Manion, L. and Morrison, K. 2007. *Research methods in education*. 6th ed. London: Routledge Falmer.

Collaboration for International ICT Policy for East and Southern Africa (CIPESA). 2006. The Eastern African Submarine Cable System (EASSy): the open access challenges and debate.<http://www.cipesa.org/files/EASSy%20doc.pdf> (Accessed 26 June 2007).

Colle, R. D. 2002. Building ICT4D capacity in and by African universities. *International Journal of Education and Development* 1 (1). <http://ijedict.dec.uwi.edu/viewarticle.php?id=13> (Accessed 10 October 2005).

Colle, R. and Roman, R. D. 1999. Communications centres and developing nations: a state of the art report. <http://www.devmedia.org/documents/Banga.htm> (Accessed 18 June 2006).

Community Information Network for Southern Africa (CINSA). 2005. Privatisation blues: Tanzanian government to lose control of PTO. <http://www.bcstimes.com/btimes/viewnews.php?category=1&newsID=82> (Accessed 20 March 2005).

Cook. J. 2005. Enhancing ICT connectivity as a strategic instrument for effective rural development: ICT diagnosis report Tanzania. <http://www.linkinglearners.net/downloads/RepICTdiagnosis.pdf> (Accessed 20 October 2005).

Corbett, S. 2008**.** Can the cellphone help end global poverty? <http://www.comminit.com/en/node/269352>(Accessed 12 August 2008).

Coyle, D. 2005 Africa: the impact of mobile phones. <http://www.vodafone.com/etc/medialib/attachments/cr_downloads.Par.78351.File.tmp/GPP_SIM_paper_3.pdf> (Accessed 20 March 2008).

Creswell, J. W. 1994. *Research design: qualitative and quantitative approaches*. Thousand Oaks: Sage.

Creswell, J. W. 2003. *Research design: qualitative, quantitative and mixed methods approaches.* 2nd ed. Thousand Oaks: Sage Publications Inc.

Creswell, J. W. and Clark, V. P. 2007. *Designing and conducting mixed methods research*. Thousand Oaks: Sage Publications Inc.

Crop and Marketing Bureau (CROMABU). 2006. CROMABU. <www.cromabul.com> (Accessed 20 February 2007).

Cronberg, T., Peter D., Ole, M. J. and Lars, Q. (eds). 1991. *Danish experiments -social constructions of technology*. New Social Science Monographs: Denmark.

Cronin, J. 2004. Rural Africa joins mobile revolution. <http://news.bbc.co.uk/1/hi/business/4036503.stm> (Accessed 26 April 2006).

Davis, P. J. 2006. Critical incident technique: a learning intervention for organisational problem solving. *Development and Learning in Organisations* 20(2):13-16. <http://www.emeraldinsight.com/Insight/ViewContentServlet?Filename=Published/EmeraldFullTextArticle/Articles/0810200205.html>(Accessed 18 February 2006).

Dalton, G. M. 1992. Quantitative approach to user satisfaction in reference services

evaluation. *South African journal of library and information science* 60 (2): 89-102.

Demeke, M. and Amha, W. 2000. An overview of training programs and approaches for the informal sector in Sub Saharan Africa. *Eastern Africa Social Science Research Review* 15(2): 95-115. <http://www.ossrea.net/eassrr/jun00/mulat/mulat.htm> (Accessed 18 February 2006).

Denzin, N. and Lincoln, Y. S. (eds). 2005. *Qualitative research*. 3rd ed. Thousand Oaks: Sage Publications Inc.

Department for International Development (DFID). 2001. Sustainable livelihoods guidance sheets 1-7. <http://www.livelihoods.org/info/info_guidancesheets.html#7> (Accessed 10 March 2006).

Derek, H., Chen, C. and Dahlman, C. J. 2005.The knowledge assessment methodology and World Bank country operations in an age of global competition. In Vitro, R. A. (ed.) The knowledge economy in development: perspectives for effective partnerships. pp. 95-106. <http://www.iadb.org/sds/doc/The%20Knowledge%20Economy.pdf> (Accessed 10 October 2008).

Dervin, B. 1996. Chaos, order and sense-making: a proposed theory for information design. <http://edfu.lis.uiuc.edu/allerton/96/w1/ Dervin_96g.html.> (Accessed 10 October 2008).

Dervin, B., Foreman-Wernet, L. and Lauterbach, E. 2003. *Sense-making methodology reader selected writings of Brenda Dervin*. Cresskill: Hampton Press.

Devereux, S. 2001. Livelihood insecurity and social protection: a re-emerging issue in rural development. *Development Policy Review* 19(4): 507-519.

Digital Opportunity Task Force (DOT Force). 2001. Digital opportunity for all: meeting the challenge. <http://www.dotforce.org/reports/DOT_Force_Report_V_5.0h.html> (Accessed 10 October 2005).

Dordick, H. S. and Wang, G. 1993. *The information society: a retrospective view*. Newbury Park: Sage Publications.

Downer, S. 1998. Telecentre case study: southern Labrador, Canada. In Fuchs, R.P. (ed.) Case histories from the global telecentre movement. <http://www.crdi.ca/en/ev-10632-201-1-DO_TOPIC.html>(Accessed 12 April 2008).

Duncombe, R. and Heeks, R. 1999. Information, ICTs and small enterprise: findings from Botswana. <http://www.man.ac.uk/idpm/idpm_dp.htm#devinf_wp> (Accessed 18 February 2006).

Duncombe, R. and Heeks. R. 2002. Enterprise across the digital divide: information systems and rural microenterprise in Botswana. *Journal of International Development* 14 (1): 61 – 74.

Duncombe, R. 2006. Using the livelihoods framework to analyse ICT applications for poverty reduction through microenterprise. *Information Technologies and International Development* 3 (3): 81–100.

Du Preez, M. 2008. Information needs and information seeking-behaviour of consulting engineers. Masters Thesis. Pretoria: University of South Africa.

e-Africa Commission. 2006. The NEPAD e-Africa Commission. <http://www.eafricacommission.org/About 1-Origin.html> (Accessed 18 October 2006).

Edvardsson, B. 1992. Service breakdowns: a study of critical incidents in an airline. *International Journal of Service Industry Management* 3(4):7-29.

Edvardsson, B. and Roos, I. 2001. Critical incident techniques: towards a framework for analysing the criticality of critical incidents. *International Journal of Service Industry Management* 12 (3):251-68.

Edwin, W. 2003. Where is good governance? <http://www.theexpress.com/express%20334/business/business_opinion.htm> (Accessed 26 April 2006).

Edwin, W. 2004. TTCL sale: Government seeks local co-investors. <http://www.bcstimes.com/btimes/viewnews.php?category=1&newsID=82> (Accessed 26 April 2006).

Ellen, D. 2000. Telecentres and the provision of community based access to electronic information in everyday life. PhD Thesis. Manchester: Manchester Metropolitan University.<http://www.hlss.mmu.ac.uk/infocomms/research/ellen/dellenphdthesis2000.pdf>(Accessed 12 April 2006).

Ellen, D. 2003. Telecentres and the provision of community based access to electronic information in everyday life in the UK. *Information Research* 8 (2) <http://informationr.net/ir/8-2/paper146.html> (Accessed 12 April 2007).

Ernberg, J. 1998. Universal access for rural development from action to strategies. *First International Conference on Rural Telecommunications, Washington, 30 November - 2 December, 1998.* <ernberg@itu.int - www.itu.int/ITU-D/univ_access/> (Accessed 20 May 2008).

Esselaar, M. and Associates. 2001. A country ICT survey for Tanzania. < http://www.milless.co.za/downloads/Sida%20report%20-%20Tanzania.pdf> (Accessed 10 May 2005).

Esselaar, S., Stavrou, A. and O'Riordan, J. 2004. VSAT case studies: Nigeria, Algeria and Tanzania. Research Report. <http://www.researchictafrica.net/images/upload/VSAT%20Ng_Al_Tz%2015.03.04%20v8.pdf> (Accessed 26 April 2006).

Esselaar, S., Stork, C., Ndiwalana, A. and Deen-Swarray, M. 2007. ICT Usage and its impact on profitability of SMEs in 13 African countries. *Information Technologies and International Development* 4 (1): 87–100.

Etta, F. E. and Parvyn-Wamahiu, S. (eds). 2003. *Information and communication technologies for development in Africa The experience with community telecentres* Vol. 2. Ottawa: International Development Research Centre (IDRC).

Everson, Z. 2007. Community radio and telecentres. <http://www.telecentre.org/en/knowledge.detail/101662/> (Accessed 18 July 2008).

Fairer-Wessels, F. 1990. Basic community needs of urban black women in Mamelodi, Pretoria, South Africa. *South African Journal of Library and Information Science* 58(4): 359–69.

Faludi, J. 2005. A new Kenyan currency. <http://www.worldchanging.com/archives/003039.html>(Accessed 25 April 2008).

Family Alliance for development and co-operation (FADECO). 2005. <http://www.fadeco.org/index.htm> (Accessed 10 March 2006).

FADECO. 2007a. FADECO gets broad band internet access.

<http://www.fadeco.org/ictnews1.htm> (Accessed 20 February 2007).
FADECO. 2007b. FADECO ICT institutional plans and capacity. <http://www.fadeco.org/ICT4D2.htm> (Accessed 20 February 2007).
Ferlander, S and Duncan, T. 2006. Bridging the dual digital divide: a local Net and an IT-café in Sweden. *Information Communication and Society* 9 (2):137-159.
Fern, E. F. 2001. *Advanced focus group research*. Thousand Oaks: Sage Publication.
Fisher, S. and Oulton, T. 1999. The critical incident technique in library and information management research. *Education for Information* 17: 113–25. <http://iospress.metapress.com/(mqqknm55a0rnaf550h5oco55)/app/home/contribution.asp?referrer=parent&backto=issue,3,7;journal,22,24;linkingpublicationresults,1:103150,1> (Accessed 11 April 2006).
Flanagan, J. C. 1954. The critical incident technique. *Psychological Bulletin* 51(4): 327-58.
Flinder, D. J. and Mills, G. E. 1993. *Theory and concepts in qualitative research: perceptions from the filed.* New York: Teachers College Press.
Ford, M. and Botha, A. 2007. MobilED: an accessible mobile learning platform for Africa?<http://researchspace.csir.co.za/dspace/bitstream/10204/1777/1/Ford1_2007.pdf> (Accessed 10 April 2008).
Fowler, F. C. 2006. Struggling with theory: a beginning scholar's experience with Mazzoni's arena models. In Anfara, A. V. and Mertz, T. N. (eds). *Theoretical frameworks in qualitative research*. Thousand Oaks: Sage Publications Inc. pp.39-58.
Franda, M. 2002. *Launching into cyberspace: internet development and politics in five world regions*. Boulder, Colorado: Lynne Rienner.
Frankfort-Nachmias, C. and Nachmias, D. 1996. *Research methods in the social sciences*. 5th ed. London: Arnold.
Fuchs, R. P. 1997. *If you have a lemon, make lemonade: a guide to the start-up of African multipurpose community telecentres pilot project*. Ottawa: International Development Research Centre (IDRC). <http://www.idrc.ca/acasi/outputs/lemonade/lemon.html> (Accessed 10 October 2005).
Fuchs, R. P. 1998. Case histories from the global telecentre movement. <http://www.crdi.ca/en/ev-10632-201-1-DO_TOPIC.html> (Accessed 12 April 2008).
Gerald, C. 2007. The lost sheep of ICT4D literature. *Information Technologies and International Development* 3 (4): 1-8.
Gerber, R. 2005. New connections: development of communications technology. In Lesame, Z. C. (ed.) *New media: technology and policy in developing countries*. Pretoria: Van Schaik Publishers. pp. 30-52.
Gerster, R. 2006. Lessons for donors: ICTs for poverty reduction. <http://www.i4donline.net/issue/july03/poverty_full.htm> (Accessed 10 September 2006).
Gerster, R. and Zimmermann, S. 2003. Information and communication technologies and poverty reduction in Sub-Sahara Africa. <http://www.sdc.admin.ch/resources/deza_product_en_1515.pdf> (Accessed 20 October 2005).
Gills, B. and Mitchel, M. 2002. Can ICT stimulate economic development?

<http://www.digitaldivide.net/articles/view.php?ArticleID=186>
(Accessed 02 February 2006).

Gillwald, A. (ed.) 2005a. *Towards an African e-index: understanding supply and demand by measuring ICT access and usage*. Link Centre: University of the Witwatersrand. <http://link.wits.ac.za/research/e-index.html>
(Accessed 02 February 2006).

Gillwald, A. 2005b. Good intentions, poor outcomes: telecommunications reform in South Africa. *Telecommunications Policy* 29: 469–491.

Global Information and Communication Technology Department (GICT). 2006. Global information and communication technologies. <http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/0,,menuPK:282828~pagePK:149018~piPK:149093~theSitePK:282823,00.html> (Accessed 17 May 2006).

Global System for Mobile Communications (GSM) Association. 2008. Taxation: the growth of mobile in East Africa. <http://www.gsmworld.com/documents/eastafrica/eastafrica_full.pdf>
(Accessed 02 September 2008).

Golafshani, N. 2003. Understanding reliability and validity in qualitative research. The Qualitative Report 8(4): 597-607.

Goodman, J. 2005. Linking mobile phone ownership and use to social capital in rural South Africa and Tanzania. *Vodafone Policy Paper Series* 3: 53-68. <http://www.vodafone.com/etc/medialib/attachments/cr_downloads.Par.78351.File.dat/GPP_SIM_paper_3.pdf> (Accessed 12 May 2008).

Gorard, S. and Taylor, C. 2004. *Combining methods in educational and social research*. London: Open University Press / McGraw-Hill Publishing Company.

Gorp, A.V. and Maitland, C. 2007. The regulatory design problem revisited: Tanzania's pioneering position in Africa. <http://web.si.umich.edu/tprc/papers/2007/711/VanGorpMaitland_TPRC07_TZ.pdf>
(Accessed 12 March 2008).

Gomm, R., Hammersley, M., and Foster, P. 2000. Case study method. In: Bryman, A 2004. Social research methods. 2nd ed. New York: Oxford University Press.

Grace, J., Kenny, C., Qiang, C., Liu, J. and Reynolds, T. 2001. *Information and communication technologies and broad-based development: a partial review of the evidence.* Washington, DC: World Bank.

Grant, F. 2004. Africans rush for mobile phones. <http://news.bbc.co.uk/1/hi/world/africa/3686463.stm> (Accessed 26 April 2006).

Greenbaum, T. L. 2000. *Moderating focus groups: a practical guide for group facilitation*. London: Sage Publications.

Guion, L. A. 2002. Triangulation: establishing the validity of qualitative studies. University of Florida. <http://edis.ifas.ufl.edu/pdffiles/FY/FY39400.pdf>
(Accessed 02 September 2006).

Gurstein, M. 2000. Introduction: community informatics: enabling communities with information and communication technologies. In Gurstein, M. (ed.) *Community informatics: enabling communities with information and communication technologies.* London: Idea Group. pp. 1-30.

Hafkin, N. and Taggart, N. 2001. Gender, information technology and developing

countries: an analytical study. <http://www.usaid.gov/wid/pubs/it01.html> (Accessed 20 October 2005).

Hamilton, R. 2003. Community phones connect South African townships. <http://news.bbc.co.uk/1/hi/technology/3246732.stm> (Accessed 26 April 2006).

Hancock, S. 2005. Mobile phones boom in Tanzania. <http://news.bbc.co.uk/1/hi/programmes/click_online/4706437.stm> (Accessed 26 April 2006).

Hannabuss, S. 1996. Research interviews. *New Library World* 97(1129): 22–30.

Harris, R. 2005. ICT for poverty reduction: "necessary but insufficient": a state-of-the-art review. <http://www.apdip.net/resources/ict-poverty-reduction/21paperreview.pdf> (Accessed 06 July 2008).

Hartig, N. 2001. The Kitimat community skills centre in British Columbia, Canada. In Latchem, C. and Walker, D. (eds).*Telecentres: case studies and key issues*. Vancouver: The Commonwealth of Learning. pp. 85-106.

Hashim, J. 2008. Learning barriers in adopting ICT among selected working women in Malaysia. *Gender in Management: An International Journal* 23 (5): 317-336

Heeks, R. 1999. Information and communication technologies, poverty and development, development informatics. Paper No.5. University of Manchester. <http://www.man.ac.uk/idpm/idpm_dp.htm> (Accessed 02 February 2006).

Heeks, R. 2002. iDevelopment not eDevelopment: special issue on ICTs and development. *Journal of International Development* 14: 1-11.

Heeks, R. 2005a. Foundations of ICTs in development. <http://www.manchester.ac.uk/idpm/dig/briefings.htm> (Accessed 02 February 2006).

Heeks, R. 2005b. ICTs and the Millennium Development Goals (MDGs): on the wrong track? Institute for Development Policy and Management. Manchester University. <http://www.devstud.org.uk/Conference05/papers/ITD/heeks.doc> (Accessed 05 February 2006).

Hellström, J. 2005. Bridging the digital divide? self-manage IT: a Ugandan case study. Master Thesis. Göteborg University. <http://www.handels.gu.se/epc/archive/00004095/01/Nr%5F6%5FJH.pdf.> (Accessed 02 June 2006).

Henstrand, J. L. 2006. Seeking an understanding of school culture: using theory as a framework for observation and analysis. In Anfara, A. V. and Mertz, T. N. (eds). *Theoretical frameworks in qualitative research.* Thousand Oaks: Sage Publications Inc. pp. 1-22.

Henwood, F., Wyatt, S., Miller, N and Senker, P. 2000. Critical perspectives on technologies, in/equalities and the information society. In: Wyatt, S., Henwood, F., Miller, N and Senker, P. (eds). *Technology and in/equality: questioning the information society*. London and New York: Routledge, 1-18.

Hermele, K. 2005. The poverty reduction strategies: a survey of the literature. <http://www.eurodad.org/uploadstore/cms/docs/PRSstudyfinalForumSyd.doc.> (Accessed 01 May 2006).

Highly Indebted Poor Countries Initiative (HIPC). 2006. Debt relief for sustainable development. <http://www.worldbank.org/hipc/about/hipcbr/hipcbr.htm>

(Accessed 28 April 2006).
Hilbert, M. 2001. From industrial economics to digital economics: an introduction to the transition. Santiago, Chile: CEPAL. <http://www.eclac.cl/publicaciones/DesarrolloProductivo/7/LCL1497P/LCL1497.pdf > (Accessed 18 May 2006).
Holtom, D. 2007. The challenge of consensus building: Tanzania's PRSP 1998-2001. *Journal of Modern African Studies* 45 (2): 233- 251.
Howard, W., Fox, G. and Turvey, C. 1996. The economic benefit of new information technology. Working paper 3/96. Ontario: University of Guelph.
Huyer, S. and Sikoska, T. 2003. Overcoming the gender digital divide: understanding ICTs and their potential for the empowerment of women. INSTRAW research paper series No.1. **<**http://www.un- instraw. org/en/docs/gender and_ict/Synthesis_Paper.pdf**>** (Accessed 20 October 2005).
Ikoja-Odongo, R. and Ocholla, D. 2004. Information seeking behavior of the informal sector entrepreneurs: the Uganda experience. *Libri* (54): 54–66.
Information for Development Programme (InfoDev). 2004. Mainstreaming ICT as tools of development and poverty reduction. <http://www.infodev.org/section/programs> (Accessed 20 August 2005).
InfoDev. 2005. Information and communication technologies, poverty and the global economy: challenges and opportunities for developing countries. <http://www.infodev.org/files/2952_file_infoDev_one_pager_Framework_Paper.pdf> (Accessed 20 August 2005).
InfoDev. 2006. Making sense of information and communication technologies for development. <http://www.infodev.org/> (Accessed 18 May 2006).
InfoDev 2008. ICT regulation tool kit: electricity. <http://www.ictregulationtoolkit.org/en/Section.3137.html> (Accessed 03 April 2008).
International Fund for Agricultural Development (IFAD). 2005. The first mile project. <http://www.ifad.org/events/wsis/phase2/factsheet/e.pdf> (Accessed 12 March 2006).
International Labour Organisation (ILO). 1972. Employment, income and equity: a strategy for increasing productive employment in Kenya, ILO, Geneva.
ILO. 2001. The potential of ICTs for development: opportunities and obstacles. Employment Report. Geneva: ILO <http://www.bib.ulb.ac.be/cdrom/werlawitie/back/hub 2.htm> (Accessed 11 April 2006).
International Monetary Fund (IMF). 2006. Heavily Indebted Poor Countries (HIPC) debt initiative. <http://www.imf.org/external/np/hipc/index.asp> (Accessed 28 April 2006).
IMF. 2007. Poverty Reduction Strategy Papers (PRSP) <http://www.imf.org/external/np/prsp/prsp.asp> (Accessed 26 May 2007).
International Telecommunication Union (ITU). 1984. The missing link report: report of the Maitland commission. <http://www.itu.int/osg/spu/sfo/missinglink/The_Missing_Ling_A4-E.pdf> (Accessed 10 September 2006).
ITU. 1989. *The changing telecommunication environment: policy consideration for members of the ITU*. Geneva: ITU.

ITU. 1998. Integrated rural development and universal access; brief description of ITU's Buenos Aires action plan programme. <http://www.itu.int/ITU-/univ_access/reports/PPstatus981016.html> (Accessed 10 May 2005).

ITU. 1999. Telecommunications indicators handbook. <http://www.itu.int> (Accessed 14 June 2004).

ITU. 2000. New technologies for rural application: final report of ITU-D focus group 7. <http://www.silocal.org/datos/si/04/07.%20New%20Techn%20for%20rural%20appl..pdf.> (Accessed 10 May 2006).

ITU. 2002. World telecommunication development report: r*einventing telecoms* <http://www.itu.int/ITUD/ict/publications/wtdr_02/material/WTDR02-Sum_E.pdf> (Accessed 10 September 2006).

ITU. 2004a. Regulatory approaches to universal services rural connectivity and universal access.<http://www.ituarabic.org/coe/VRC/RURAL%20Final%20Report%20in%20Eng..doc.> (Accessed 14 June 2005).

ITU. 2004b. ITU, UNHCR and UNESCO launch high-impact humanitarian project for refugees. <http://www.itu.int/newsarchive/press_releases/2001/24.html> (Accessed 20 February 2007).

ITU. 2005a. Licensing in the era of liberalisation and convergence. <http://www.itu.int/ITU-D/treg/Case_Studies/Licensing/TANZANIA_CS.pdf> (Accessed 28 April 2006).

ITU. 2005b. World telecommunication development report. Geneva: ITU. <http://www.itu.int/ITU-D/ict/publications/wtdr_03/> (Accessed 12 June 2008).

ITU. 2006. Progress made in bridging the digital divide. <http://www.un.org/News/Press/docs/2006/dev2588.doc.htm> (Accessed 18 October 2006).

Intelecon Research and Consultancy Ltd. 2002. Tanzania: rural ICT market opportunity report. African connection: Vancouver, Canada. <http://www.infodev.org/projects/telecommunications/351africa/TANZANIA%20Rural%20Market%20Assessment%20-%20FINAL.pdf> ((Accessed 14 June 2005).

Intelecon Research and Consultancy. 2004. Universal access funds. <http://www.inteleconresearch.com/pdf/ua%20funds%202004%20update.pdf> (Accessed 26 June 2007).

Intven, H. and Tetrault, M. 2002. *Telecommunication regulation handbook.* Washington DC: Info Dev. <http://www.infodev.org/content/library/detail/842> (Accessed 14 June 2004).

Isamuyo, Z. 2006. Open access ICT infrastructure in rural Tanzania: prototype design. Masters Thesis. Stockholm: Royal Institute of Technology (KTH).

Islam, N. 2005. Multi stakeholder partnership in ICT4D: a case study of village phone programme in Bangladesh: report prepared for the multi stakeholder partnerships in ICT4D Case Study Program. <http://topics.developmentgateway.org/evaluation/rc/ItemDetail.do~1074665?itemId=1074665> (Accessed 18 October 2006).

Jamali, D. 2003. Post-war telecommunication reforms in Lebanon: trends and challenges. *Info* 5(2): 34-44.

Jensen, M. 1998. African Telecentres as models for rural telecomms development.

Paper delivered to the ITU Regional Seminar on Community Telecentres, Budapest December 1998. ITU, Geneva.

Jensen, M. 2000. African internet status. <http://www.africaaction.org/docs00/inet0010.htm> (Accessed 20 April 2007).

Jensen, M. 2004. Public telephone and internet services in Africa: the rise of telecentre and cybercafé. APEC Telecommunications and Information Working Group 30th Meeting 19-24 September 2004, Singapore. <http://teleCentre.rdec.gov.tw/tel30_teleCentre/tele_02%20Public%20Tel%20n%20Internet%20Svcs%20in%20Africa.pdf> (Accessed 18 October 2006).

Jensen, M. and Esterhuysen, A. 2001. *The community telecentre cookbook for Africa: recipes for self-sustainability.* Paris: UNESCO. <http://unesdoc.unesco.org/images/0012/001230/123004e.pdf.> (Accessed 18 October 2006).

Jeunhomme, G. C. 2000. Measuring telecommunication infrastructure needs and demand. Masters Thesis. Massachusetts: Massachusetts Institute of Technology <http://itc.mit.edu/rpcp/Pubs/Theses/gwena.pdf> (Accessed 10 September 2006).

Jipp, A. 1963. Wealth of nations and telephone density, *Telecommunications Journal* 3: 199-201.

Joppe, M. 2000. The research process. <http://www.ryerson.ca/~mjoppe/rp.htm> (Accessed 25 February 1998).

Kalba, K. 2007. The adoption of mobile phones in emerging markets: global diffusion and the rural challenge. <http://www.marshall.usc.edu/assets/006/5577.pdf.> (Accessed 12 May 2008).

Kamuzora, F. 2003. Goodbye to projects? the institutional impacts of a livelihood approach on development interventions. <http://www.bradford.ac.uk/acad/dppc/research/poverty/projects/goodbye/papers/GtPWP9-Magu.pdf.> (Accessed 02 May 2006).

Kamuzora, F. 2005. E-commerce journey for Tanzanian small and medium enterprises (SMEs): A case of tourism industry. <http://www.tzonline.org/pdf/ecommercejourneyfortanzaniasmes.pdf> (Accessed 02 February 2006).

Kanfi, S. and Tulus F. 1998. Acacia: What is a telecentre? On CentraTEL, British Council, Johannesburg.

Kaniki, A. M. 1989. Agricultural information needs in Zambia: a study of a two-way information flow. PhD Thesis. Ann Arbor: University of Pittsburgh.

Kaniki, A. M. 1994. Community resource centres and resource centre forums in the transformation and post-transformation era in South Africa. *African Journal of Library Archives and Information Science* 4(1):27-54.

Kaniki, A. M. 1995. Exploratory study of information needs in the Kwa-Ngwanase (Natal) and Qumbu (Transkei) communities of South Africa. *South African Journal of Library and Information Science* 63(1): 9-18.

Kaniki A. M. 1996. Information for all: challenges for South African library information science education and training. Inaugural lecture, University of Natal, Pietermaritzburg.

Kaniki, A. M. 2000. Doing an information search. In: Terre Blanche, M. and Durrheim,

K. (eds). Research in practice: applied methods for the social sciences. Cape Town: University of Cape Town Press. pp. 17-28.

Kaniki, A. M. 2001. Community profiling and needs assessment. In Stilwell, C., Leach, A and Burton, S. (eds.) *Knowledge, information and development: an African perspective*. Pietermaritzburg: School of Human and Social Studies, University of Natal. pp. 187–99.

Kanungo, S. 2004. On the emancipatory role of rural information systems. *Information Technology and People* 17 (4): 407-422.

Kapange, B. 2000. The role of agricultural information in decision-making: experience of the Tanzanian agricultural research information system. Masters Thesis. Edmonton-Canada: University of Alberta. <http://www.slis.ualberta.ca/cap00/bkapange/intropro.htm> (Accessed 26 May 2007).

Karagwe District Council. 2006. District socio-economic profile. Unpublished document.

Katz, M. and Harvey, R. 1994. *Microeconomics.* 2nd. ed. Burr Ridge: Irwin.

Kaul, M. 2007. Community radio: mouthpiece of change. <http://www.boloji.com/wfs5/wfs783.htm> (Accessed 19 March 2008).

Kearney, K.S. and Hyle, A. E. 2006. A look through the Kubler-Ross theoretical lens. In Anfara, A. V. and Mertz, T. N. (eds). *Theoretical frameworks in qualitative research.* Thousand Oaks: Sage Publications Inc. pp. 109-128.

Kebede, G. 2002. Modeling the information needs of users in the electronic information environment. PhD Thesis. Pietermaritzburg: University of Natal.

Kelly, T. 2005. Changing ICT ranking of African nations. *The Southern African Journal of Information and Communication* 5(1): 40-48.<http://link.wits.ac.za/journal/j05-kelly-ict-rankings.pdf>(Accessed 18 October 2006).

Keniston, K. 1999. Language, power, and software. <http://www.mit.edu/people/kken/papers1/Language%20Power%20Software.htm> (Accessed 02 September 2008).

Kenny, C. 2002. The costs and benefits of ICT for direct poverty alleviation. <http://www.infodev.org/library/Kenny/povpap7.pdf> (Accessed 20 September 2005).

Kenny, C. and Keremane, R. 2007. Towards universal telephone access: market progress and progress beyond the market. *Telecommunications Policy* 31:155–163.

Kent, D. W. and Mushi, P. S. D. 1995. The education and training of Tanzania. *Education Research Paper* 18: 143-150. <http://www.dfid.gov.uk/pubs/files/edtrainartedpaper18.pdf> (Accessed 20 February 2007).

Kerlinger, F. N. 1970. *Foundation of behavioral research*. Fort Worth: Harcourt.

Kerlinger, F. N. 1986. *Foundations of behavioral research*. 3rd ed. Fort Worth: Harcourt.

Kerretts-Makau, M. 2007. Through the looking glass: consumer issues: an African regulatory experience. <http://www.regulateonline.org/component/option,com_docman/task,doc_download/gid,21/.> (Accessed 20 April 2008).

Khan, N. S. and Bawden, D. 2005. Community informatics in libraries in Pakistan

current status, future prospects. *New Library World* 106 (1218/1219): 532-540.
Kiondo, E. 1998. Access to gender and development information by rural women in Tanga region Tanzania. PhD Thesis. Pietermaritzburg: University of Natal.
Kirk, J. and Miller, M. L. 1986. *Reliability and validity in qualitative research*. Beverly Hills: Sage Publications.
Kiswahili Linux (Klnx). 2004**.** Because it could be done we play our part Swahili free and open source software. <http://www.o.ne.tz> (Accessed 03 December 2007).
Kothari, C. R.1990. *Research methodology: methods and techniques*. New Delhi: Wishwa Prakashan.
Kothari, C. R. 2004. *Research methodology: methods and techniques*. 2nd ed. New Delhi: Willey Eastern Limited.
Kousoyiannis, A. 1979. *Modern Microeconomics* 2nd ed. Houndmills: MacMillan Press Limited.
Kraft, D. H. and Boyce, B. R. 1991. *Operations research for libraries and information agencies: techniques for the evaluation of management division alternatives*. San Diego: Academic Press.
Kumar, R. 1996. *Research methodology: a step by step guide to beginners*. London: Sage Publications.
Kumar, R. 1999. *Research methodology: a step by step guide for beginners*. London: Sage Publication.
Kvale, S. 1996. *Interviews*. London: Sage Publications.
Latchem, C. 2001. Using telecentres in support of distance education. <www.col.org/Knowledge/ks_telecentres.htm> (Accessed 19 March 2008).
Latchem, C. and Walker, D. 2001. Telecentres: case studies and key issues. <http://www.col.org/colweb/webdav/site/myjahiasite/shared/docs/Telecentres_complete.pdf>(Accessed 12 April 2008).
Laughton, P. and Rensleigh, C. 2007. Investigating on-line pornography at the University of Johannesburg. *South African Journal of Information Management* 9(4).
Leckie, G. L. and Pettigrew, K. L. 2000. A general model of information seeking of professionals: role theory through the back door? <http://www.isschool.washington.edu/fisher/pubs/ISIC.1997.pdf> (Accessed 11 April 2006).
LeCompte, J. and Preissle, J. 1993. *Ethnography and qualitative design in education research.* 2nd ed. London: Academic Press Ltd.
Lee, M. 2006. What's missing in the feminist research in new information and communication technologies? *Feminist Media Studies* 6(2): 192-210.
Leedy, P. D. and Ormrod, J. E. 2001. *Practical research: planning and design* 7th ed. Upper Saddle River, New Jersey: Prentice-Hall.
Leedy, P. D. and Ormrod, J. E. 2005. *Practical research: planning and designing*. 8th ed. Pearson: Merrill Prentice Hall.
Lesame, Z. C. 2005a. Bridging the digital divide in South Africa and selected African countries. In Lesame, Z. C. (ed) *New media: technology and policy in developing countries.* Pretoria: Van Schaik Publishers. pp.1-16.
Lesame, Z. C. 2005b. South Africa's ICT policy and practice: impact of globalisation.

In Lesame, Z. C. (ed) *New media: technology and policy in developing countries*. Pretoria: Van Schaik Publishers. pp. 216- 239.

Lesame, Z. C. 2005c. The socio and economic aspect of the internet. In Lesame, Z.C. (ed)2004. *New media: technology and policy in developing countries*. Pretoria: Van Schaik. pp. 206-215.

Lewis, C. 2004. Universality and quality of service regulation. <http://elearn.nettelafrica.org/courses/TR507/ page19.htm> (Accessed 10 November 2004).

Lincoln, Y. S. and Guba, E. G. 1985. *Naturalistic inquiry*. 3rd ed. California: Sage.

Ling, R. and Pedersen, P. E. (eds). 2005. *Mobile communication re-negotiation of the social sphere.* London: Springer-Verlag.

Long, N. and Long, A. (eds). 1992. *Battlefield of knowledge: the interlocking of theory and practice in social research and development.* Routledge: London.

Lourenço, M. 2003. Suitcase radio for radio browsing: Mali. <http://portal.unesco.org/ci/en/ev.php-URL_ID=6152&URL_DO=DO_TOPIC&URL_SECTION=201.html> (Accessed 19 March 2008).

Luft, O. 2008. Journalism in Africa: Kenyan media accused of inciting post-election Violence.<http://www.zimbio.com/Kenya's+Political+Violence/articles/40/Journalism+Africa+Kenyan+media+accused+inciting>(Accessed 29 August 2008).

Lyn, R. 2005. *Handling qualitative data: a practical guide*. London: Sage Publication.

Madden, G. and Savage, S. 1999. Telecommunication productivity, catch up and innovation. *Telecommunications Policy* 23 (1): 65-81.

Maepa, M. E. 2000. Information needs and information-seeking patterns of rural people in the Northern Province. PhD Thesis. Johannesburg. Rand Afrikaans University.

Maepa, M. E. and Mphahlele, M. E. 2004. Information and communication technology needs, use patterns and barriers in three telecentres in Limpopo Province, South Africa. *Proceedings of the XVI Standing Conference of Eastern, Central and Southern African Library and Information Association (SCECSAL)*. Kampala, Uganda, 5th - 9th July 2004.

Mafu, S. 2004. From the oral tradition to the information era: the case of Tanzania *International Journal on Multicultural Societies 6* (1): 53 – 78.

Magu District Council. 2006. District socio-economic profile. Unpublished document.

Mahunnah, M. 2007. Tanzania's place in the mobile revolution. <http://www.mobipawa.co.tz/mobi.pawa?kom=106420&nid=9> (Accessed 20 March 2008).

Majtenyi, C. 2005. Microsoft releases Kiswahili program. <http://www.voanews.com/english/archive/2005-12/2005-12-14-voa45.cfm?CFID=166123218&CFTOKEN=34217503> (Accessed 03 December 2007).

Mansell, R. and When, U. 1998. *Information for sustainable development*. University of Sussex: Oxford University Press. <http://www.sussex.ac.uk/spru/ink/knowledge.html> (Accessed 01 May 2005).

Manyele, A., Greyson, K., Kabadi, M. D. and Mwalembe, S. 2005. Community television broadcasting model for rural Tanzania. Paper presented in the First Tanzania Commission for Science and Technology (COSTECH) Scientific and

Technological Conference. Golden Tulip Hotel Dar es Salaam, Tanzania 24 – 26 May, 2006.

Marshall, C. and Rossman, G. B. 1989. *Designing qualitative research.* Newbury Park, CA: Sage.

Marshall, C. and Rossman, G. B. 1999. *Designing qualitative research*. 3rd ed. Thousand Oaks: Sage Publication.

Massawe, M. 2004. ICT access initiatives for rural areas in Tanzania: an overview of rural community telecentres in Tanzania. *Proceedings of the XVI Standing Conference of Eastern, Central and Southern African Library and Information Associations (SCECSAL).* Kampala, Uganda, 5th – 9th July 2004.

Mathur, A. and Ambani, D. 2005. ICT and rural societies: opportunities for growth. *The International Information and Library Review* 37(4): 345-351.

Mathison, S. 1988. Why triangulate? *Educational Research* 17(2):13-17.

Mayanja, M. 2003. The African community telecentre: in search of sustainability. <http://www.infobridge.org/asp/documents/4084.doc.>(Accessed 25 August 2008).

Mbilinyi, M. 2000. The new face of IMF structural adjustment: Tanzania. <http://www.nadir.org/nadir/initiativ/agp/free/imf/africa/tanzan.htm> (Accessed 01 May 2006).

McClellard, S. B. 1994. Training needs assessment data-gathering method: part 3, focus groups. *Journal of European Industrial Training* 18(3): 29-32.

McKemey, K., Scott, N. and Souter, D. 2003. *Innovative demand models for telecommunications services: final technical report for the knowledge and research programme*. London: UK Department for International Development.

McMillan, J.H. and Schumacher, S. 2001. *Research in education: a conceptual introduction*. 5th ed. New York: Longman.

McNamara, K. 2008. Enhancing the livelihoods of the rural poor through ICT: a knowledge map Tanzania country study. <http://www.infodev.org/en/Publication.517.html>(Accessed 02 September 2008).

Meadows, D. H. and Robinson, J. B. 1985. *The electronic oracle*. Chichester, Sussex: John Wiley.

Melkote, S. R. and Steeves, H. L. 2001. *Communication for development in the third world: theory and practice for empowerment.* New Delhi: Sage.

Melody, W. H. (ed.) 1997a. *Telecom reforms: principles, politics and regulation.* Lyngby: Technical University of Denmark.

Melody, W. H. 1997b. Policy objectives and models of regulation. In Melody W. *Telecom reforms: principles, policies and regulation practices*: Lyngby: Technical University of Denmark. pp. 13-29.

Menda, A. 2004. CROMABU: enhancing market opportunities for small farmers in Mwanza, Tanzania. <http://www.tanzaniagateway.org/docs/CROMABU.pdf> (Accessed 20 February 2007).

Mercer, C. 2005. Telecentres and transformation: modernising Tanzania through the internet. *African Affairs* 105(419): 243-264.

Merton, R. K., Fiske, M. and Kendall, P. L. 1990. The *focus interview: a manual of problems and procedures*. 2nd ed. London: Collier Macmillan.

Mfungahema, R. C. 2006. Policy and regulatory approach on the next generation

networks: the case of Tanzania. <http://www.itu.int/ITU-T/worksem/ngn/200610/presentations/npr-p2.pdf.>(Accessed 26 June 2007).

Mikenga, S. 2006. EASSY cable stakeholders meet to approve ICT infrastructure framework.<http://www.info.gov.za/speeches/2006/06040712451001.htm> (Accessed 26 June 2007).

Mikkelsen, B. 1995. *Methods for development work and research: a guide for practitioners.* New Delhi: Sage Publications.

Miller, P.M. and Wilson, J. M. 1984. *Dictionary of social science methods*. Chichester: John Wiley.

Mireny. J. 2006. Investment climate boosts telecom industry robust growth. <http://www.ippmedia.com/ipp/guardian/2006/11/04/77700.html> (Accessed 26 June 2006).

Mitchell, M. and Gills, B. 2002. Making sense of the relationship between information communication technologies and economic development. <http://cbdd.wsu.edu/media/pdf/presentations> (Accessed 02 February 2006).

Mlaki, T. 2005. Potential of ICT in development. DPG – ICT seminar on Mkukuta and ICT. 26th May 2005. Dar es Salaam. <http://www.tzdac.or.tz/main/DPG%20subgroups/ICT/seminar/Mlaki.ppt> (Accessed 18 February 2006).

Mlaki, T. 2007. "Impact assessment of ICT in education in Tanzania: the case of the National Examination Council in dissemination of examination results" Paper presented in Helsinki Process, ICT Track Workshop "Assessing the Impact of ICT in Education Workshop" 23 and 24 May, 2007. <http://www.helsinkiprocess.fi/netcomm/ImgLib/33/257/Final%20Report%20of%20the%20workshop%20on%20assessing%20the%20impact%20of%20ICT%20in%20education.pdf> (Accessed 19 March 2008).

Moindrot, P. 1998. Telecentre case study: Wales. In Fuchs, R.P. (ed.) Case histories from the global telecentre movement. <http://www.crdi.ca/en/ev-10632-201-1-DO_TOPIC.html>(Accessed 12 April 2008).

Mokhiber, R. 2003. Tanzania: planning for poverty. *Multinational Monitor* 24 (11). <http://multinationalmonitor.org/mm2003/03november/nov03front.html> (Accessed 20 March 2005).

Molnár, S. and Karvalics, L. Z. 2002. Two models and six types of telecentres: a typological experiment. *Proceedings of the second biennial DISSAnet Conference (ProLISSA) Eds: Bothma, T. and Kaniki, A. Infuse, Pretoria*. pp. 327 – 332. <http://www.dissanet.com/jsp/modules/repository/index.jsp?repository=Library&action=view_file&id=Library.1040203207> (Accessed 18 October 2006).

Molony, T. S. J. 2006a**.** Information and communication technology in the developing country informal construction sector: a case study from Tanzania. *Journal of Information Technology* 261. <http://www.parliament.uk/documents/upload/postpn261.pdf> (Accessed 20 September 2007).

Molony, T. S. J. 2006b. Running out of credit: the limitations of mobile telephony in an East African agricultural marketing system. <http://www.acts.or.ke/news/press/2006/007.html> (Accessed 25 August 2008).

Moodley, S. and Cloete, F. 2004. Multilateral ICT for development strategies: critical

reflections. In Bothma, T. J. D. and Kaniki, A. (ed). *Proceedings of the 3rd biennial DISSAnet Conference, Pretoria, 28-29 October 2004.* Pretoria: Infuse. 401-419.

Morgan, D. L. 1988. *Focus group as qualitative research*. London: Sage.

Morgan, D. L. and Scannell, A. U. 1998. *Planning focus groups: focus group kit 2.* Thousands Oaks: Sage Publications.

Moser, C. 1998. The asset-vulnerability framework: reassessing urban poverty reduction strategies. *World Development* 26 (1): 1-19.

Morris, R. 1994. Toward a user-centreed information service. *Journal of the American Society for Information Science* 45 (1): 11-30.

Morse, J. M., Barrett, M., Mayan, M., Olson, K., and Spiers, J. 2002. Verification strategies for establishing reliability and validity in qualitative research. *International Journal of Qualitative Methods* 1(2). <http://www.ualberta.ca/~iiqm/backissues/1_2Final/pdf/morseetal.pdf> (Accessed 10 June 2006).

Mosia, L. N. and Ngulube, P. 2005. Managing the collective intelligence of local communities for the sustainable utilisation of estuaries in the Eastern Cape, South Africa. *South African Journal of Libraries and Information Science* 71(2): 175-185.

Mouly, G. J. 1978. *Education research: the art and science of investigation*. Boston: Allyn and Bacon.

Mouton, J. 2001. *How to succeed in your masters and doctoral studies: a South African guide and resource book.* Pretoria: Van Schaiks.

Mouton, J. and Marais, H. C. 1993. *Basic concept in the methodology of social science.* Pretoria: Human Sciences Research Council.

Mugenda, O. M. and Mugenda, A. G. 2003. *Research methods: quantitative and qualitative approaches*. Nairobi: African Centre for Technology Studies (ACTS) Press.

Mukhebi, A. 2004**.** Kenya Agricultural Commodity Exchange Limited (KACE) reaching the poor in rural Kenya with market information: a case study of a market information system. Paper presented at the CTA seminar on the role of information tools in food security, Maputo, Mozambique, November 8-12 2004.

Munyua, H. 2000. Information and communication technologies for rural development and food security: lessons from field experiences in developing countries. CAB International, Africa Regional Centre. <http://www.fao.org/sd/CDdirect/CDre0055b.htm> (Accessed 20 April 2008).

Mureithi, M. 2002. Evolution of telecommunication policy reforms in East Africa: setting new policy strategies to anchor benefits of policy reforms. <http://link.wits.ac.za/journal/j0301-muriuki-fin.pdf> (Accessed 10 December 2004).

Mwakalobo, B. S. A. 1999. Price reforms and smallholder agricultural production in Rungwe district. <http://www.fiuc.org/esap/MOROG/MOROG5/General/price.pdf> (Accessed 22 April 2008).

Mwandosya, M. J. 2001. Statement of Hon. Prof. M. J. Mwandosya (MP), Minister for Communication and Transport, at the official handling over ceremony of TTCL to MSI-DETECON consortium which was held at the Dar es Salaam Sheraton hotel 28th February 2001.

http://www.psrctz.com/Press%20Releases/Prof.%20Mwandosya's%20Speech-280201.htm> (Accessed 28 April 2006).

Mwathi, F. 2008. ICT enabled agriculture. <http://www.telecentre.org/en/news.detail/102706> (Accessed 06 August 2008).

Myhr, J. and Nordström, L. 2006. Livelihood changes enabled by mobile phones-the case of Tanzanian fishermen. Bachelor Thesis. Uppsala: Uppsala University. <http://www.diva-portal.org/diva/getDocument?urn_nbn_se_uu_diva-8103-2__fulltext.pdf.> (Accessed 12 May 2008).

Nasikye, E. 2007. Telecentre discussion list for North Africa and the Middle East. <http://dgroups.idrc.ca/groups/tc- ena/index.cfm?op=dsp_showmsg&listname=tc-mena&msgid=578845&cat_id=20862> (Accessed 25 August 2008).

Neuman, W.L. 2006. *Social research methods: qualitative and quantitative approaches* 6th ed. Boston: Pearson.

New Partnership for Africa's Development (NEPAD). 2005. <http://www.nepad.org/2005/files/home.php>(Accessed 10 September 2006).

NEPAD. 2006a. EASSy cable stakeholders meet to approve ICT infrastructure framework. <http://www.eafricacommission.org/docs/media_releaseapril6_EASSy_cable.doc> (Accessed 18 October 2006).

NEPAD. 2006b. Update report to ICT ministers on the development of the NEPAD broadband ICT infrastructure network for eastern and southern Africa, including the EASSy cable presented to the ministers of ICT by the chairperson of the intergovernmental working committee (i-gwc). <http://www.eafricacommission.org/docs/folder2.pdf> (Accessed 18 October 2006).

Ndume, V. 2004. Interactive content as motivation factor for e-learning. <http://www.cit.ac.ug/events/srec/PapersSubmitted/vitalis.pdf> (Accessed 10 December 2004).

Ngalinda, I. and Mutagahywa, B. 2005. Tanzania. In Gillward, A. (ed.) Towards an African e-index: household and individual ICT access and use across 10 African countries. The Link Centre: University of the Witwatersrand. <http://link.wits.ac.za/research/e-index.html> (Accessed 02 February 2006).

Ngara District Council. 2006. District socio-economic profile. Unpublished document.

Ngulube, P. 2003. Preservation and access to public records and archives in South Africa. PhD Thesis. Pietermaritzburg: University of Natal.

Ngulube, P. 2005. Research procedures used by Masters of Information Studies students at the University of Natal in the period 1982-2002 with special reference to their sampling techniques and survey response rates: a methodological discourse. *The International Information and Library Review* 37: 127-143.

Nguo, J., Lusaka N., Nkando, M. and Karimi, M. 2005. *ICT4D in Eastern Africa*. Nairobi: Arid Lands Information Network – Eastern Africa (ALIN-EA).

Nielinger, O. 2003. Rural ICT utilisation in Tanzania: empirical findings from Kasulu, Magu, and Sengerema. <http://www.duei.de/iak/de/content/forschung/pdf/projektnieltext6.pdf> (Accessed 01 May 2005).

Njuguna, E. 2006. ICT policy in developing countries: understanding the bottlenecks. <http://www.ptc.org/events/ptc06/program/public/proceedings/Emmanuel%20Nj

uguna paper w143.pdf> (Accessed 26 May 2007).
Nnafie, I. 2002. Internet cafes in Dar es Salaam: problems and opportunity – recommendations for the e-think tank Tanzania. Masters Thesis. Netherlands: Eindhoven University of Technology. <http://www.ourtanzania.com/cafes.pdf> (Accessed 10 October 2005).
Nulens, G. 2003. The digital divide and development communication theory. *Communicatio: South African Journal of Communication Theory and Research* 29 (1 and 2): 68-78.
Nyaki, C. A. 2000. *ICTs and poverty: a literature review*. Ottawa: International Development Research Centre.
Obra, A. R., Cámara, S. B. and Meléndez, A. P. 2002. An analysis of teleworking centres in Spain. *Facilities* 20 (11/12): 394-399.
Organisation for Economic Co-operation and Development (OECD). 2001. Understanding the digital divide. Paris: OECD Publications.
OECD. 2004. ICTs and economic growth in developing countries. <ttp://ideas.repec.org/p/wpa/wuwpdc/0501008.html> (Accessed 18 February 2006).
Oestmann, S. and Dymond, A.C. 2001. Telecentres: experience, lessons and trend. <http://www.col.org/colweb/webdav/site/myjahiasite/shared/docs/chapter%2001.pdf> (Accessed 10 September 2006).
Ojo, T. 2004. Old paradigm and information and communication technologies for development agenda in Africa: modernisation as context. *Journal of Information Technology Impact* 4(3): 139-150.<http://www.jiti.com/v04/v4n3.139-150.pdf> (Accessed 10 September 2006).
Ojo, T. 2005. Wiring sub-Saharan Africa for development. *International Journal of Education and Development using ICT* 1 (3): 94-107.
Oliver, P. 2004. *Writing your thesis*. London: Sage Publications.
Oriare, P. 2008. Role of media in Kenya's post-election violence. *Daily Nation, March 03 2008* http://www.abugidainfo.com/?p=3857> (Accessed 12 August 2008).
Osborn, Z. D. 2006. African languages and information and communication technologies: literacy, access, and the future. Selected Proceedings of the 35th Annual Conference on African Linguistics, ed. John Mugane *et al*., 86-93. Somerville, MA: Cascadilla Proceedings Project. <http://www.lingref.com/cpp/acal/35/paper1299.pdf> (Accessed 02 September 2008).
Oyaro, K. 2008. Kenya: the media is not innocent. <http://www.internews.org/articles/2008/20080202_ips_kenya.shtm> (Accessed 29 August 2008).
Oyedemi, T. 2005. Universal access wheel: towards achieving universal access to ICT in Africa. *The Southern African Journal of Information and Communication* 5 (1) 90-107. <http://link.wits.ac.za/journal/j05-oyedemi-universal-access.pdf> (Accessed 18 October 2006).
Oyedemi, T. and Lesame, Z. 2005. South Africa: an information society? In Lesame, N.C. (ed.) *New media: technology and policy in developing countries*. Van Schaik. Pretoria.
Oyelaran-Oyeyinka, B. and Adeya, C.N. 2004. Internet access in Africa: empirical evidence from Kenya and Nigeria. *Telematics and Informatics* 21: 67–81.

Ozcatalbas, O., Brumfield, R. B. and Ozkan, B. 2004. The agricultural information system for farmers in Turkey. *Information Development* 20 (2): 97-105.

Parker, D., Kirkpatrick, C. and Theodorakopoulou, F. C. 2005. Infrastructure regulation and poverty reduction in developing countries: a review of the evidence and research agenda. <http://www.competitionregulation.org.uk/conferences/Brazil/Papers/Parker_Kirkpatrick_Figueira.pdf.> (Accessed 18 October 2006).

Parkinson, S. 2005.*Telecentres, access and development: experience and lessons from Uganda and South Africa.* Ottawa: International Development Research Centre. <http://www.idrc.ca/openebooks/189-2/> (Accessed 18 October 2006).

Patton, M. Q. 1990. *Qualitative evaluation and research methods*. 2nd ed. London: Sage Publications.

Patton, M. Q. 2002. Qualitative research and evaluation methods. 3rd ed. Thousand Oaks: Sage Publications.

Payne, G. and Payne, J. 2004. Key concepts in social research. London: Sage.

Peters, C. 1994. *A guide to academic writing.* Eldoret: Zapf Chancery.

Peterson, R. A. 2002. *Constructing effective questionnaire*. Thousand Oaks, CA: Sage.

Pettersson, M. and Carlsson, I. 2004. Perspectives on digital divide: internet usage and attitudes in Arusha, Tanzania. Bachelor Thesis. Stockholm: Södertörn University College.

Phillips, E. M. and Pugh, D. S. 1994. *How to get a PhD: a handbook for students and their supervisors*. 2nd ed. Buckingham: Open University.

Phombeah, G. 2004. Microsoft to launch in Kiswahili. <http://newsbbc.co.uk/2/hi/africa/3816717.stm> (Accessed 03 December 2007).

Pickard, A. J. 2007. *Research methods in information*. London: Facet Publishing.

Pisciotta, A. A. 1997. Global trends in privatisation and liberalisation. In Melody, W. H. (ed.) *Telecom reforms: principles, politics and regulation.* Lyngby: Technical University of Denmark.

Pool, I. 1990. *Technologies without boundaries: on telecommunications in a global age.* Cambridge, MA: Harvard University Press.

Practical Action (PA). 2003. Orkonerei radio: the voice of livestock keepers. <http://practicalaction.org/practicalanswers/pdf_thumb.php?s=l&im=community_radio.pdf> (Accessed 25 April 2008).

Prakoso, I. 2006. Community radio and poverty reduction: Indonesian cases. http://documents.amarc.org/files/2007-02-13/Community_Radio_-Poverty_Reduction_eng.doc (Accessed 12 May 2008).

Ramfrez, R. 2000. Rural and remote communities harnessing ICTs for community development. PhD Thesis. Ontario: University of Guelph.

Rasmussen, A. M. 2001. Information and development: the information effect. *Information Development* 17(1):12-18.

Ratcliffe, J. 2002. Scenario planning: strategic interview and conversations. *Foresight* 4(1):19-30.

Reeve, I. 1998. Telecentre case study: Australia. In Fuchs, R.P. (ed.) Case histories from the global telecentre movement. <http://www.crdi.ca/en/ev-10632-201-1-DO_TOPIC.html> (Accessed 12 April 2008).

Reitz, J. M. 2007. Online dictionary for library and information science. Libraries Unlimited. <http://lu.com/odlis/search.cfm> (Accessed 12 June 2008).

Remenyi, D. and and Money, A. 2004. Research supervision for supervisors and their Students. Reading: Academic Conference Limited.

Rhodes, J. 2005. Constructing an ethical 'bestfit' research model to investigate the role of e-commerce in a South African women's rural development organisation. <http://jorhodes.blogspot.com/2005/01/constructing-ethical-bestfit-research.html> (Accessed 06 July 2008).

Richardson, D. 2005. How can agricultural extension best harness ICTs to improve rural livelihoods in deve1eloping countries? <http://departments.agri.huji.ac.il/economics/gelb-how-11.pdf> (Accessed 10 September 2006).

Roberts, M. and Kernick, H. 2006. Feasibility study for SMS-enabled collection and delivery of rural market information <http://www.ide-cambodia.org/download/SMS-MIS%20Feasibility%20Study_final_2006-10-21.pdf> (Accessed 08 September 2008).

Robins, M. 2002. Are African women online just ICT consumers? *The International Journal for Communication Studies* 64 (3): 235-49.

Robson, C. 2002. *Real world research: a resource for social scientists and practitioners-researchers*. 2nd ed. London: Blackwell publishing.

Rodriguez, F. and Wilson, E. J. 2000. Are poor countries losing the information revolution? InfoDev Working Paper. Washington: World Bank.

Roman, R. and Colle, R.D. 2002. Themes and issues in telecentre sustainability. <http://www.sed.man.ac.uk/idpm/research/publications/wp/di/documents/di_wp10.pdf > (Accessed 20 September 2007).

Ross, W. 2004. Mobile markets deny middlemen. <http://news.bbc.co.uk/2/hi/africa/3321167.stm> (Accessed 08 September 2008).

Rostow, W. 1960. *The stages of economic growth: a non-communist manifesto*. London: Cambridge University Press.

Rothernberge-Alaami, J. and Pal, J. 2005. Rural telecentres impact assessment and the political economy of ICT for development (ICT4D). <http://brie.berkeley.edu/~briewww/publications/wp164.pdf> (Accessed 10 January 2006).

Rowley, J. 2002. Using case studies in research. *Management Research News* 25(1): 16-27.

Said, A. S. 2003. Information seeking in electronic environment: an investigation of forestry researchers in Tanzania. Masters Thesis. Dar es Salaam: University of Dar Es Salaam.

Samuel, J. Shah, N., Hadingham, W. 2005. Mobile communications in South Africa, Tanzania and Egypt: results from community and business surveys. *Vodafone Policy Paper Series* 3: 44-52. <http://www.vodafone.com/etc/medialib/attachments/cr_downloads.Par.78351.File.dat/GPP_SIM_paper_3.pdf> (Accessed 12 May 2008).

Savolainen, R. 1993. The sense-making theory: reviewing the interests of a user-centreed

approach to information seeking and use. *Information Processing and Management* 29 (1): 13-28.

Savolainen, R. 2006**.** Information use as gap-bridging: the viewpoint of sense-making methodology. *Journal of the American Society for Information Science and Technology* 57 (8): 1116 – 1125.

Schware, R. 2003. Information and communications technology (ICT) agencies: functions, structures, and best operational practices. *Info* 5(3): 3-7.

Scott, N., Batchelor, S., Ridley, J., Jorgensen, B. 2004. The impact of mobile phones in Africa.<http://www.commissionforafrica.org/english/report/background/scott_et_al_background.pdf> (Accessed 12 May 2008).

Seale, C. 1999. Quality in qualitative research. *Qualitative Inquiry* 5(4):465-478.

Sebastian, C. 2007. Tanzania eager to rep mobile banking benefits. <http://www.mobipawa.co.tz/mobi.pawa?kom=106420&nid=10> (Accessed 20 March 2008).

Sebusang, S. E. M. and Masupe, S. 2002 ICT development in Botswana: connectivity for rural communities. <http://link.wits.ac.za/journal/j0401-sebusang-botswana.pdf> (Accessed 20 March 2006).

Sedoyeka, E. and Hunaiti, Z. 2008. WiMAX in Tanzania: a breakthrough for underserved areas. *Info* 10 (2): 34-4.

Seiden, M. H. 1992. *Cable television USA: an Analysis of government policy.* New York: Praeger Publishers.

Sekaran, U. 2003. *Research methods for business: a skill-building approach*. 4th ed. New York: John Wiley and Sons, Inc.

Sen. A. 1998. *Development as freedom*. Oxford: Oxford University Press.

Sengerema District Council. 2006. District socio-economic profile. Unpublished.

Sengerema MCT Project. 2003. Sengerema multipurpose community telecentre. <http://www.sengerema.or.tz/Default.htm> (Accessed 20 February 2007).

Sharing with other people network (Swopnet). 2007. Ngara multipurpose community telecentre. <http://www.swopnet.org/profiles/CC0007.pdf.> (Accessed 20 February 2007).

Sheppard, K. 2001. The remote community service telecentres of Newfoundland and Labrador, Canada. In Latchem, C. and Walker, D. Telecentres: case studies and key issues. <http://www.col.org/colweb/webdav/site/myjahiasite/shared/docs/Telecentres_complete.pdf> (Accessed 12 April 2008).

Short, G. 2001. The Western Australia telecentre network. In Latchem, C. and Walker, D. Telecentres: case studies and key issues. <http://www.col.org/colweb/webdav/site/myjahiasite/shared/docs/Telecentres_complete.pdf> (Accessed 12 April 2008).

Sife, A. S., Lwoga, E. T. and Chilimo, W. L. 2004. Appropriation of information and communication technologies (ICT) for poverty reduction: the case of the agricultural sector. *Proceedings of the Annual Scientific Conference and General Meeting of Agricultural Engineering Society*, Morogoro, Tanzania, 22 - 24 November, 2004.

Simpson, L. 2005. Community informatics and sustainability: why social capital matters. *The Journal of Community Informatics 1(2): 102-119*

Singh, A. 2006. Information and communication technologies (ICT) and sustainable

development. <http://www.ceeindia.org/esf/download/paper28.pdf>
(Accessed 18 June 2006).
Sinha, C. 2005. Effect of mobile telephony on empowering rural communities in developing countries. <http://www.irfd.org/events/wf2005/papers/sinha_chaitali.pdf>
(Accessed 03 December 2007).
Silverman, D. 2001. Interpreting qualitative data: methods for analysing talk, text and interaction. London: Sage.

Slater, D. and Kwami, J. 2005. Embeddedness and escape: internet and mobile use as poverty reduction strategies in Ghana.
<http://www.isrg.info/ISRGWorkingPaper4.pdf>
(Accessed 18 October 2006).
Slater, D., Tacchi, J. and Lewis, P. 2002. *Ethnographic monitoring and evaluation of community multimedia centres: a study of Kothmale community radio and internet Project, Sri Lanka*. London: DFID.
Snyman, M. and Snyman, R. 2003. Getting information to disadvantaged rural communities: the centre approach. *South Africa Journal of Library and Information Science* 69(2): 95-107.
Soergel, D. 1976. Is user satisfaction a Hobgoblin? *Journal of the American Society of Information Science* 27(4 July-Augusts): 256-259.
Soriano, C.R. 2007. Exploring the ICT and rural poverty reduction link: community telecentre and rural livelihoods in Wu'an, China. *The Electronic Journal of Information Systems in Developing Countries* 32 (1): 1-15.
Souter, D., Scott, N., Garforth, C., Jain, R., Mascarenhas, O. and McKemey, K. 2005. The economic impact of telecommunications on rural livelihoods and poverty reduction: a study of rural communities in India (Gujarat), Mozambique and Tanzania.
<http://www.cto.int/downloads_programmes/kar8347.pdf>
(Accessed 20 March 2006).
Stanley, R. 2005. Village phone: tool for empowerment.
<http://www.ruralfinance.org/cds_upload/1131965318718_GFUSA_VillagePhoneEmpowerment_1_.pdf.> (Accessed 18 October 2006).
Stilwell, C. 2000. Venturing into academic publishing: some issues and guidelines for new authors. *African Journal of Library, Archives and Information Sciences* 10 (2): 167-175.
Stilwell, C. 2002. The case for informationally based social inclusion for sex workers: a South African exploratory study. *Libri* 52: 67–77.
<http://www.librijournal.org/pdf/2002-2pp67-77.pdf> (Accessed 11 April 2006).
Strauss, A. and Corbin, J. 1990. *Basics of qualitative research: grounded theory procedures and techniques*. London: Sage.
Sutherland, E. 2007. The regulation of the quality of service in mobile networks *Info* 9 (6): 17-34.
Suzuki, A. and Chamala, S. 1998. Role of telecentres in rural development in Australia. *Agricultural Information Technology in Asia and Oceania*
<http://zoushoku.narc.affrc.go.jp/ADR/AFITA/afita/afita-conf/1998/P08.pdf>
(Accessed 06 July 2008).
Swedish International Development Co-operation Agency (SIDA). 2005. ICTs for

poverty alleviation: basic tool and enabling sector. Greenberg ICT services: Swedish International Development Co-operation Agency. <http://www.eldis.org/fulltext/sidaictpoverty.pdf> (Accessed 10 October 2005).

Swiss Agency for Development and Co-operation (SDC) and the Global Knowledge Partnership(GKP). 2004. Using ICT for reaching the millennium development goals: moving from rhetoric to action. <http://www.globalknowledge.org/ict4d/index.cfm?menuid=83&parentid=52> (Accessed 18 May 2006).

Tabing, L. 2002. How to do community radio: a primer for community radio operators. <http://www.unesco.org/webworld> (Accessed 21 May 2008).

Tacchi, J., Slater, D. and Hearn, G. 2003. Ethnographic action research. <http://unescodelhi.nic.in/publications/ear.pdf> (Accessed 12 January 2005).

Tacchi, J., Slater, D. and Lewis, P. 2003. Evaluating community based media initiatives: an ethnographic action research approach. < http://www.ourmedianet.org/papers/om2003/Tacchi_OM3.pdf> (Accessed 18 February 2006).

Tan, L. 2007. Rural communication access centres in Tanzania: lessons learned from setting up and managing IICD supported RCA Centres. <http://www.iicd.org/files/Rural-Communication-Access-Centres-Tanzania-2007-Liang-Tan.pdf> (Accessed 12 May 2008).

TCRA. 2005. The implementation of the new converged licensing framework in the ICT sector in Tanzania. <http://www.tcra.go.tz/IMPLEMENTATION%20OF%20%20THE%20NEW%20COVERGED%20LICENCING%20FRAMEWORK.pdf.> (Accessed 28 April 2006).

TCRA. 2006b. Second public consultation document on migration from analogue to digital broadcasting in Tanzania: the case for the establishment of the multiplex operator.<http://www.tcra.go.tz/consultative_docs/digitalSwitchOverMultiplexOperator.pdf> (Accessed 11 October 2007).

TCRA. 2007a. Statistics: telecommunication. <http://www.tcra.go.tz/publications/telecom.html> (Accessed 21 June 2007).

TCRA. 2007b. License categories. <http://www.tcra.go.tz/licensing/license_categories.php> (Accessed 26 May 2007).

TCRA. 2007c. Licensed operators. <http://www.tcra.go.tz/licensing/licenced_operators.php> (Accessed 26 May 2007).

TCRA. 2008. Licensed operators in the postal sector. <http://www.tcra.go.tz/licensing/courier_operators.php>(Accessed 22 May 2008).

Tanzania Commission for Science and Technology (COSTECH). 2005. Contact e-addresses for community telecentres and ICT for development projects in Tanzania. <http://www.costech.or.tz/contact%20address.htm> (Accessed 10 March 2006).

Tanzania Free and Open Source Software (TAFOSSA). 2007. Tanzania gets its national browser. <http://www.tafossa.or.tz/news/view_news_item.php?id=97&intVariationID=1>(Accessed 03 December 2007).

Temu, A. E. and Temu, A. A. 2006. High value agricultural products for smallholder markets in Sub-Saharan Africa: trends, opportunities and research priorities.

Paper presented at an International Workshop on How Can the Poor Benefit from the Growing Markets for High Value Agricultural Products? International Centre for Tropical Agriculture, Cali, Colombia. 3 -5 October 2005.

The Kiswahili Linux Localisation Project. 2006. The Kiswahili linux localisation project. Department of Computer Science University of Dar es Salaam. <http://www.kilinux.udsm.ac.tz/kiblog/index.html> (Accessed 03 December 2007).

Thompson, A. (ed.) 2007. *The media and the Rwanda genocide*. Kampala: Fountain Publishers Ltd.

Tongia, R. 2006. Why is connectivity in developing regions expensive: policy challenges more than technical limitations? <http://delivery.acm.org/10.1145/1140000/1135980/p991-tongia.pdf?key1=1135980&key2=0115680221&coll=GUIDE&dl=GUIDE&CFID=2035746&CFTOKEN=77437354>(Accessed 06 August 2008).

Trochim, W. M. K. 2001. *Research methods knowledge base.* 2nd ed. Cincinnati: Atomic Dog Publishing.

Trochim, W.M. K. 2006. Research methods knowledge base: non-probability sampling. <http://www.socialresearchmethods.net/kb/sampnon.htm> (Accessed 18 February 2006).

Trujillo, M. F. 2003. Does the global digital divide have anything to do with progress in development? <http://topics.developmentgateway.org/ict/sdm/previewDocument.do~activeDocumentId=261236> (Accessed 10 September 2006).

Tusubira, F. F., Kaggwa, I. and Ongora, J. 2005. Uganda. In Gilward, A. (ed). *Towards an African e-index: household and individual ICT access and use across 10 African countries.* The Link Centre: University of the Witwatersrand. <http://link.wits.ac.za/research/e-index.html> (Accessed 02 February 2006).

UgaBYTES Initiative. 2006. Telecentre directory. <http://www.ugabytes.org/directory/tdirectory.php> (Accessed 08 March 2007).

Ulanga, P. 2005. The post-exclusivity licensing framework. <http://dgroups.org/groups/swopnet/attach/swopnet/190490/The_New_Licensing_Framework.ppt?ois=no> (Accessed 26 June 2007).

Ulrich, P. 2004. Poverty reduction through access to information and communication technologies in rural areas: an analysis of the survey results from the social impact assessment conducted by the Chinese ministry of science and technology and the United Nations Development Program. *The Electronic Journal on Information Systems in Developing Countries* 16 (7): 1-38.

United Nations Development Programme (UNDP). 1999. *Reducing the gap between the knows and the know nots.* New York: UNDP.

UNDP. 2000. Information and communication technologies for development. <http://www.acca21.org.cn/info21/index.htm> (Accessed 17 May 2006).

UNDP. 2001. Human development report: making new technologies work for human development. New York: United Nations Development Programme. <http://www.undp.org/hdr2001> (Accessed 02 December 2004).

UNDP. 2002. Human Development Report: deepening democracy in a fragmented world. New York: United Nations Development Programme. <http://hdr.undp.org/reports/global/2002/en/pdf/complete.pdf>

(Accessed 02 December 2005).

UNDP. 2003 Millennium Development Goals: a compact among nations to end human poverty. New York: United Nations Development Programme. <http://hdr.undp.org/reports/global/2003/en/pdf/complete.pdf> (Accessed 14 December 2005).

UNDP. 2005. Human Development Report: international co-operation at crossroads: aid, trade and security in unequal world. New York: United Nations Development Programme. <http://hdr.undp.org/reports/global/2005/pdf/HDR05_complete.pdf> (Accessed 10 December 2005).

United Nations Educational, Scientific and Cultural Organisation (UNESCO). 2003a. Strategy to combat digital divide.

<http://portal.unesco.org/es/ev.phpurl_id=6060&url_do=do_topic&url_section=201.html> (Accessed 10 October 2005).

UNESCO. 2003b. Gender issue in the information society. <http://portal.unesco.org/ci/en/files/12847/10704640205gender_issues.pdf/gender_issues.pdf> (Accessed 20 March 2006).

UNESCO. 2004. How to do community radio: a primer for community radio operators. <http://unesdoc.unesco.org/images/0013/001342/134208e.pdf> (Accessed 20 March 2006).

United Nations Population Fund (UNFPA). 2002. Strengthening partnerships among local FM radio networks and reproductive health agencies on HIV/AIDS. **<**http://www.unfpa.org/upload/lib_pub_file/486_filename_157_filename_commmunityradio.pdf.**>** (Accessed 18 May 2006).

United Nations ICT Task Force (UNICT). 2002. Plan of action. New York: UNICT Task Force. <http://www.unicttaskforce.org/about/planofaction.html> (Accessed 18 May 2006).

United Republic of Tanzania (URT). 1993. Tanzania Communications Commission (TCC) Act. <http://www.tcra.go.tz/Publications/Tanzania%20Communications%20Act%2018%201993.pdf > (Accessed 12 May 2005).

URT. 1997a. National Telecommunication Policy (NTP). <http://www.tcra.go.tz/Publications/NTP1997.pdf> (Accessed 10 October 2005).

URT. 1997b. Mwanza region socio-economic profile. <http://www.tzonline.org/pdf/Mwanza.pdf> (Accessed 12 May 2006).

URT. 1997c. National Poverty Eradication Strategy (NPES). <http://www.tzonline.org/pdf/thenationalpovertyeradicationstrategy.pdf> (Accessed 12 May 2006).

URT. 1998. Development vision 2025. <http://www.tanzania.go.tz/vision.htm> (Accessed 12 May 2005).

URT. 2000a. Tanzania Poverty Reduction Strategy Paper (PRSP). <http://www.imf.org/external/NP/prsp/2000/tza/02/100100.pdf> (Accessed 12 May 2005).

URT. 2000b. *The economic survey. Dar es Salaam*. The resident's office-planning and privatisation. Dar es Salaam, Tanzania.

URT. 2001. Educational sector country status report: Tanzania.

<http://www.moe.go.tz/pdf/Educ.%20Sector%20Country%20Status%20Report.pdf> (Accessed 20 March 2006).

URT. 2002a. Agriculture. <http://www.tanzania.go.tz/agriculturef.html> (Accessed 10 October 2005).

URT. 2002b. Population and housing census 2002. <http://www.tanzania.go.tz/census/censusdb/ageSexDistrictSingleYears.asp> (Accessed 17 May 2006).

URT. 2003a. National Information and Communication Technology Policy. <http://www.tcra.go.tz/Publications/Nationa%20ICT%20Policy%20of%202003.pdf> (Accessed 10 October 2005).

URT. 2003b. Tanzania Communications Regulatory Authority (TCRA) Act. <http://www.tcra.go.tz/Publications/Tanzania%20Communications%20Regulatory%20Act-2003.pdf> (Accessed 12 May 2005).

URT. 2004a. Country profile.<http://www.tanzania.go.tz/issuesf.html> (Accessed 10 February 2006).

URT. 2004b. Tanzania in figures 2004. Tanzania Bureau of Statistics. <http://www.nbs.go.tz/TZ_FIGURES/TZ_FIG_2004_JUL_20b.pdf> (Accessed 20 February 2006).

URT. 2004c. Evaluation of the Poverty Reduction Strategy Paper (PRSP): process and arrangements under the Poverty Reduction and Growth Facility (PRGF). <www.worldbank.org/oed/prsp> (Accessed 26 May 2007).

URT. 2004d. Statement by the Tanzanian delegation at the world summit on the information society (WSIS) preparatory committee meeting of the Tunis phase of WSIS, Hammamet, Tunisia; 24 - 26 June, 2004 <http://www.tzonline.org/dbtw-wpd/exec/dbtwpub.dll> (Accessed 26 February 2009).

URT. 2005a. National Strategy for Growth and Poverty Reduction. <http://www.tanzania.go.tz/pdf/nsgrptext.pdf> (Accessed 12 May 2005).

URT. 2005b. Communication strategy for the national strategy for growth and reduction of poverty. <http://www.povertymonitoring.go.tz/downloads/new/commstrat.pdf> (Accessed 10 October 2005).

URT. 2005c. Tanzania poverty and human development report. < http://www.repoa.or.tz/documents_storage/PHDR%202005%20FINAL.pdf> (Accessed 27 February 2006).

URT. 2006a. National website. <http://www.tanzania.go.tz> (Accessed 20 March 2005).

URT. 2006b. Tanzania national website: poverty eradication. <http://www.tanzania.go.tz/poverty.html> (Accessed 20 March 2005).

URT. 2006c Karagwe district. <http://www.tanzania.go.tz/districts/karagwe/karagwe.html> (Accessed 12 May 2006).

URT. 2007. The Universal Communications Services Access Act. *The Gazette of the United Republic of Tanzania* 2 (88): 19-40 (12th January 2007).

Ure, J. 2003. Regulation and poverty reduction. Paper presented at the ESCAP Forum on Government Policies and Strategies on Information and Communication Technology (ICT) for Rural Poverty Reduction in Asia and the Pacific Region, 27-28 November 2003, Bangkok, Thailand.

Urquhart, C. 2001. Bridging information requirements and information needs assessment: do scenarios and vignettes provide a link? *Information Research* 6(2). <http://informationr.net/ir/6-2/paper102.html> (Accessed 14 April 2006).

Urquhart, C., Light, A., Thomas, R., Barker, A., Yeoman, J.C., Armstrong, C., Fenton, R., Lonsdale, R. and Spink, S. 2003. Critical incident technique and explicitation interviewing in studies of information behaviour. *Library and Information Science Research* 25(1):63-88.

Van Belle, J. P. and Trusler, J. 2005. An interpretivist case study of a South African rural multi-purpose community centre. *The Journal of Community Informatics* 1(2): 140-157. <http://ci-journal.net/index.php/ciej/article/viewPDFInterstitial/231/188.> (Accessed 18 October 2006).

Verhoest, P. 2000. The myth of universal service: Hermeneutic considerations and political recommendations. *Media, Culture and Society* 22(5): 595-610.

Vitro, R.A. 1990. Information: a strategy for economic growth. *Proceedings of the Special Libraries Association.* State-of-the-Art Institute, 6–8 November 1989. Washington: 87–100.

Vodafone. 2008. Vodacom announces intention to launch Vodafone M-PESA mobile money transfer service in Tanzania. <http://www.vodafone.com/start/media_relations/news/group_press_releases/2007/vodacom_announces.html> (Accessed 20 April 2008).

Von Seggern, M and Young, N. J. 2003. The focus group method in libraries: issues relating to process and data analysis. *Reference Service Reviews* 31(3): 272-284.

Wallsten, S. J. 2000. Telecommunications privatisation in developing countries: the real effects of exclusivity periods. <http://www.isnie.org/ISNIE01/Papers01/wallsten.pdf.> (Accessed 26 April 2006).

Wallsten, S. J. 2002. Regulation and internet use in developing countries. <http://aei.brookings.org/admin/pdffiles/phpR5.pdf.> (Accessed 18 October 2006).

Walsh, M. 2003. Teaching qualitative analysis using QSR NVivo. *The Qualitative Report 8*(2). <http://www.nova.edu/ssss/QR/qr8-2/walsh.pdf> (Accessed 18 February 2006).

Wanyeki, L. M. 2002. Supporting the growth and development of community media. <http://www.comminit.com/en/node/1889> (Accessed 20 March 2006).

Warschauer, M. 2003. *Technology and social inclusion: rethinking the digital d**ivide***. Cambridge, MA: Massachusetts Institute of Technology Press.

Washington State University (WSU), Centre to Bridge the Digital Divide (CBDD). 2006. NetTel. <http://cbdd.wsu.edu/initiatives/nettel/index.html.> (Accessed 07 August 2006).

Waves for Freedom.1995. Report on the sixth world conference of community radio broadcasters. Dakar, Senegal, January 23-39, 1995.

Welsh, E. 2002. Dealing with data: using NVivo in the qualitative data analysis process. *Qualitative Social Research 3*(2). <http://www.qualitative-research.net/fqs/fqseng.htm> (Accessed 18 February 2006).

Welman, C., Kruger, F. and Mitchell, B. 2005. *Research methodology*. 3rd ed. Cape Town: Oxford University Press.

Whyte, A. 2000. Assessing community telecentres: guidelines for researchers. Ottawa: International Development Research Centre (IDRC). <http://www.idrc.ca/en/ev-9415-201-1-DO_TOPIC.html> (Accessed 10 September 2006).

Wild, K. 2003. A global overview of e-strategies: making the link with poverty and the Millennium Development Goals. A discussion paper for the 5th Session of the United Nations ICT Task Force Geneva, September 12 -13, 2003. <http://wsispapers.choike.org/global_overview_strategies.pdf> (Accessed 20 February 2006).

Willig, C. 2001. *Introducing qualitative research in psychology: adventures in theory and method*. New York. Open University Press.

Wilson, M. 2001. Understanding international ICT and development disclosure. *The Southern African Journal of Information and Communication* 3. <http://link.wits.ac.za/journal/j0301-merridy-fin.pdf> (Accessed 27 June 2006).

Wilson, T. D. 1981. On user studies and information needs. *Journal of Documentation* 37(1): 3-15.

Winter, G. 2000. A comparative discussion of the notion of validity in qualitative and quantitative research. *The Qualitative Report*, *4*(3 and 4). <http://www.nova.edu/ssss/QR/QR4-3/winter.html> (Accessed 25 February 1998).

World Bank. 1996. *Increasing internet connectivity in sub-Saharan Africa*. Washington: World Bank.

World Bank. 1998. World Development Report 1998/1999: knowledge for development. Oxford: Oxford University Press. <http://www.worldbank.org/wdr/wdr98/overview.pdf> (Accessed 18 May 2005).

World Bank. 2001. World development report 2000/2001: attacking poverty. <http://siteresources.worldbank.org/INTPOVERTY/Resources/WDR/overview.pdf> (Accessed 10 September 2006).

World Bank. 2003. Global poverty monitoring at the World Bank: why calculate international poverty estimates. <http://unstats.un.org/unsd/mi/techgroup/Presentations/Goal%201/Target%201/WB1_global_poverty_monitoring.ppt#256,1,Global poverty monitoring at the World Bank> (Accessed 10 May 2005).

World Bank, 2004. Composite indicators of development. <http://www.worldbank.org/depweb/english/beyond/beyondco/beg_15.pdf> (Accessed 27 June 2006).

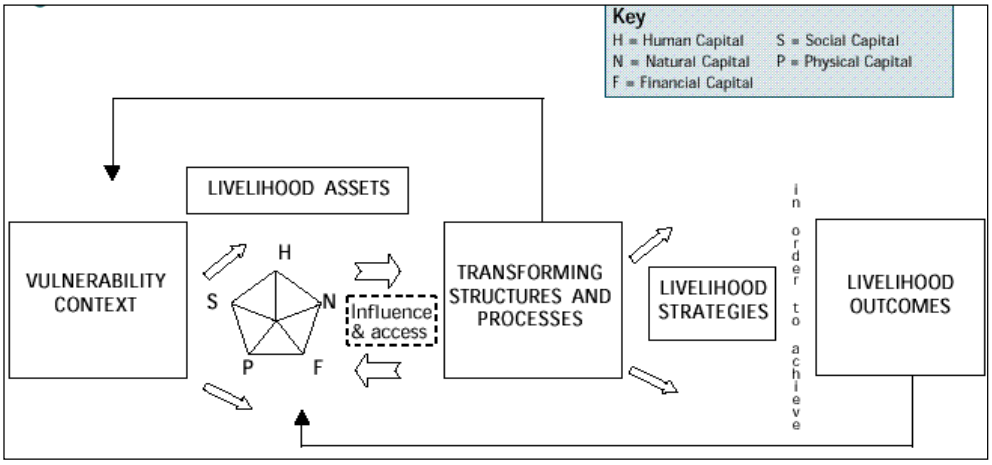
World Business Council for Sustainable Development (WBCSD). 2007. Mobility for Development, Dar es Salaam, Tanzania. <http://www.wbcsd.org/DocRoot/pMbeZ7VhTJ9frqM35EuQ/tanzania-case-study-final.pdf> (Accessed 20 March 2006).

World Summit on Information Society (WSIS). 2003. World Summit on Information Society: Phase I. Geneva: Switzerland. http://www.wsisgeneva2003.org/01_switzerland/phase1.html> (Accessed 17 May 2006).

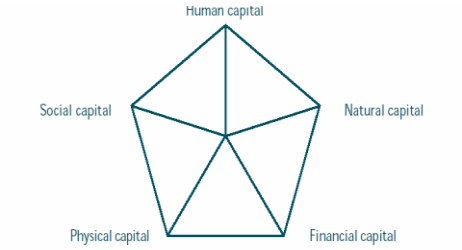
World Summit on Information Society (WSIS). 2006. <http://www.itu.int/wsis/> (Accessed 27 June 2006).

Wolcott, H. T. 1999. *Ethnography: a way of seeing*. Walnut Creek, CA: AltaMira.
Wyatt, S., Henwood, F., Miller, N. and Senker, P. 2000. *Technology and in/equality: questioning the information society*. London: Routledge.
Yin, R. K. 1994. *Case study research: design and methods*. 2nd ed. Thousand Oaks: Sage Publications.
Yin, R. K. 2003. *Applications of case study research*. 2nd ed. Thousand Oaks: Sage Publications.
Yin, R. K. (ed). 2004. *The case study anthology*. Thousand Oaks: Sage Publications.
Yonah, Z. 2002**.** Building infrastructure for ICT development in Tanzania. Paper presented at the national stakeholders' workshop on national ICT policy held at the Royal Palm Hotel, Dar es Salaam, Tanzania 25th May 2002. <http://www.moct.go.tz/ict/buildinginfras.doc> (Accessed 10 December 2004).
Zaijtman, A. 2004. Upwardly mobile. *BBC FOCUS on Africa*. January-March: pp. 22.
Zappacosta, M. 2008. Connectivity in rural regions: bottlenecks and policy options. <http://www.jrc.es/home/report/english/articles/vol58/REG1E586.htm> (Accessed 20 March 2006).

Appendix 3.1 Sustainable livelihoods framework



The asset pentagon



Source: DFID (2001)

Appendix 4.1: Interview protocol for users and non-users of telecentres

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The purpose of this study is to investigate how and for what purposes ICTs are used by people in selected rural areas of Tanzania

The response of this interview protocol will help to understand the impact of ICTs on the livelihoods of people who are living in communities where telecentres are located. It will also help to find out the extent to which ICTs contribute to sustainable livelihoods in these communities. The findings of the study will help to recommend better ways that telecentres should operate and better ways of increasing rural ICTs accessibility and use.

Name of the village……..
Name of the ward…….
Name of district……
Date of interview…….

No…….

SECTION 1: RESPONDENT'S DATA

1.1 Name of the respondent (optional)……

1.2 Age of the respondent…….

1.3 Gender

1= [ ] Male

2= [ ] Female

1.4 Have you received any formal education?

1= [ ] Yes

2= [ ] No

1.5 If the answer to 1.4 was yes what is the highest level of education you have achieved?

1= [ ] Primary school

2= [ ] Lower secondary (Forms I-IV)

3= [ ] Senior secondary schools (Forms V-VI)

4= [ ] Post secondary e.g. Diploma, Degree

5= [ ] Adult Education

6= [ ] Have never gone to school

1.6 If the answer to 1.4 was No do you know how to read and write?

1= [ ] Yes

2= [ ] No

1.7 What is your occupation?

……

……

SECTION 2: HOUSEHOLD DATA

2.1 Relationship of the respondent to the head of the household

1= [ ] Head of the household

2= [ ] Spouse

3= [ ] Other, specify

……

……

……

2.2 How many people are living regularly in your household? (Not short time visitors)

……

……

……

2.3 To what extent does your family depend on support from family members living else where?

1= [ ] Not at all
2= [ ] Moderately
3= [ ] Highly

SECTION 3: ECONOMIC STATUS

3.1 Regarding your house, do you?

1= [ ] Rent
2= [ ] Personal ownership
3= [ ] Other, specify…….....
……
……...

3.2 Does the house have electricity?

1= [ ] Yes
2= [ ] No

3.3 Does the house have protected water? (Piped or protected well?)

1= [ ] Yes
2= [ ] No

3.4 Does the house have a fixed line telephone?

1= [ ] Yes
2= [ ] No

3.5 Do you, own a

1= [ ] Automobile (Car/Bike)
2= [ ] Computer
3= [ ] Bicycle
4= [ ] Radio
5= [ ] TV
6= [ ] Mobile phones
7= [ ] Tractor
8= [ ] Boat
9= [ ] Truck

Give detailed explanations

……
……
……

SECTION 4: ACCESS TO ICTS

4.1 Access to services at the telecentre / awareness

4.1.1 Have you heard of the telecentre before this interview?

1= [ ] Yes
2= [ ] No
……
……

4.1.2 If yes, how did you hear about it?
……
……
4.1.3 Have you ever visited the telecentre?
1= [ ] Yes
2= [ ] No

4.1.4 If yes, what were your main reasons for visiting the telecentre?
1= [ ] Meeting people
2= [ ] Telephone services
3= [ ] Internet service
4= [ ] Computer training
5= [ ] Other reasons explain…….
……
……

4.1.5 Have you ever used the services offered by the telecentre?
1= [ ] Yes
2= [ ] No

4.1.6 If you have used telecentre services, were you satisfied with the services?
1= [ ] Yes
2= [ ] No
Please give reasons for your answer.
……
……

4.1.7 If you are using the telecentre, how often do you use the telecentre in a week?
……
……
……
4.1.8 If you are not using the telecentre, explain why?
……
……
……
……

4.2 Ability (skills) to use computers, Internet (www) and email
4.2.1 Do you know how to use the computer?
1= [ ] Yes

2= [ ] No

4.2.2 Do you know how to use the Internet (www)?
1= [ ] Yes
2= [ ] No
4.2.3 Have you used email?
1= [ ] Yes
2= [ ] No

4.2.4 Do you have an email address?
1= [ ] Yes
2= [ ] No

4.2.5 How do you communicate by email?
1= [ ] Use it myself
2= [ ] Asks an attendant to email / browse for me
3= [ ] Have never used email
4.2.6 What do you normally use email for?
(*Ask this question if the answer for 4.2.3 was yes*)

1= [ ] Business
2= [ ] Communication with friends and family
3= [ ] Gaining new knowledge
4= [ ] Emergencies (family and friends)

Other reasons please explain
……
……
…….....
4.2.7 How many times do you use emails in a month?
(If have used email)
……..
…….
4.3 Affordability of services at the telecentre
4.3.1 How much does it cost to use your mostly used service?
……
……
……

4.3.2 Do you feel the cost is too expensive for you?
1= [ ] Yes
2= [ ] No

Please explain your answer

……
……
……

SECTION 5: USE PATTERN

5.1 When using the Internet what type of web sites do you browse most often?

(Ask this question if respondents are using Internet)

1= [ ] News
2= [ ] Educational related
3= [ ] Entertainment
4= [ ] Social
5= [ ] Religious affairs
6= [ ] Business/work
7= [ ] Government information
8= [ ] Health issues

Others explain

……
……

5.2 Are you using other means of communication apart from email?

1= [ ] Yes
2= [ ] No

5.3 If the answer to 5.2 is yes please indicated whether the use of the listed means of communication has increased or decreased since you started using the Internet?

5.3.1 Use of letters and post office

1= [ ] Increased
2= [ ] Decreased
3= [ ] No difference

5.3.2 Face to face communication

1= [ ] Increased
2= [ ] Decreased
3= [ ] No difference

5.3.3 Making social visits

1= [ ] Increased
2= [ ] Decreased
3= [ ] No difference

5.3.4 Use of phone of public phones

1= [ ] Increased
2= [ ] Decreased
3= [ ] No difference

5.3.5 Use of newspapers

1= [ ] Increased
2= [ ] Decreased
3= [ ] No difference

5.3.9 Referral to village council

1= [ ] Increased
2= [ ] Decreased
3= [ ] No difference

Gives detailed explanation

……
……
…….....

SECTION 6: IMPACT OF TELECENTRE SERVICES ON LIVELIHOODS

6.1 In your personal opinion what were the three biggest community-related problems you faced before the telecentre project came in?

……
……
……
……

6.1.1 In your personal opinion, has this problem been solved since the telecentre was introduced?

1= [ ] Yes
2= [ ] No
3= [ ] Too early to tell

Give detailed explanation

……
……

6.1.2 How well do these statements agree with your expectations of the telecentre? It will probably lead to…

6.1.2.1 More contacts among residents

1= [ ] Totally agree
2= [ ] Partially agree
3= [ ] Neutral
4= [ ] Partially disagree
5= [ ] Totally disagree
Give reasons for your answer please ……..
……...

6.1.2.2 Stronger social cohesion

1= [ ] Totally agree
2= [ ] Partially agree
3= [ ] Neutral
4= [ ] Partially disagree

5= [ ] Totally disagree
Give reasons for your answer please ……..
……...

6.1.2.3 Increased income of the people in this community

1= [ ] Totally agree
2= [ ] Partially agree
3= [ ] Neutral
4= [ ] Partially disagree
5= [ ] Totally disagree
Give reasons for your answer please ……..
……...

6.2 Impact of the use of Internet on human capital

6.2.1 Have you ever attended computer training classes in the telecentre or in other places?

1= [ ] Yes
2= [ ] No

6.2.2 If yes provide the details of that training

……
……
……

6.2.3 In what ways has the training being useful to you? Such as enable you to get a new job. Give detailed explanations

……
……
……

6.2.4 If have never attended any computer training, why?

……
……
……

6.2.5 How has your investment in the use of the Internet been helpful in knowledge acquisition?

……
……
……
……

6.2.6 If you were unable to access the Internet any more, how would this impact you in terms of knowledge acquisition?

……
……
……

6.4 Impact of the use of Internet/email on financial capital

6.4.1 How has your investment in the use of the Internet been helpful for economic activities? Please explain

……
……
……
.....

6.4.2 How has your investment in the use of email been helpful for economic activities? Please explain

……
……
……**.....**
.....

6.4.3 If you were unable to access the Internet any more, how would this impact you economically?

……
……
……
……**.....**
……

6.4.4 If you were unable to access email any more, how would this impact you economically?

……
……
……
……**.....**
…….

6.5 Impact of the use of Internet/email on social capital

6.5.1 How has your investment in the use of the Internet been helpful for social communications?

……
……
……
……**.....**

6.5.2 How has your investment in the use of email been helpful for social communications?

……
……
……
……**.....**

6.5.3 If you were unable to access the Internet any more, how would this impact you socially?

……
……

……
…….....

6.5.4 If you were unable to access email any more, how would this impact you socially?
……
……
……
…….....

6.6 Impact of the use of Internet/email on the vulnerability context

6.6.1 Is the Internet important in emergency situations?

1= [ ] Very important
2= [ ] Important
3= [ ] No opinion
4= [ ] Somehow important
5= [ ] Not important

Please give examples.
……
……
……

6.6.2 Is the email important in emergency situations?

1= [ ] Very important
2= [ ] Important
3= [ ] No opinion
4= [ ] Somehow important
5= [ ] Not important

Please give examples.
……
……
……

6. 7 Barriers to the use of Internet/email

6.7.1 Do you face any problems with regard of the use of Internet?

1= [ ] Yes
2= [ ] No

6.7.2 If the answer to 6.7.1 is yes please explain those problems
……
……
……
…….....

6.7.3 Do you face any problems with regard of the use of email?

1= [ ] Yes

2= [ ] No

6.7.4 If the answer to 6.7.3 is yes please explain those problems

……
……
……
…….....

6.7.5 Do you face any problems with regard of the use of other services provided by the telecentre?

1= [ ] Yes
2= [ ] No

6.7.6 If the answer to 6.7.5 is yes please explain those problems

……
……
……
…….....

SECTION 7: IMPACT OF TELEPHONE USE ON LIVELIHOODS

7.1 Access, affordability and use of telephones

7.1.1 What type of telephone do you use mostly?

1 = [ ] Fixed line telephone
2 = [ ] Mobile telephone
3 = [ ] Not using any phone

7.1.2 Do you own a mobile phone?

1= [ ] Yes
2= [ ] No

7.1.3 How do you access the telephone that you mostly use?

……
……

7.3 Impact of the use of the telephone on financial capital

7.3.1 How has your investment in the use of the telephone been helpful for economic activities? Please explain

……
……
……
……
……

7.3.2 If you were unable to access the telephone any more, how would this impact you economically?

……
……
……
…….....
……

7.4 Impact of the use of the telephone on social capital

7.4.1 How has your investment in the use of the telephone been helpful for social communications?

……
……
……
…….....

7.4.2 If you were unable to access the telephone any more, how would this impact you socially?

……
……
……
…….....

7.4.3 Is the telephone important in staying in touch with relatives or friends who are out side this community?

1= [ ] Very important
2= [ ] Important
3= [ ] No opinion
4= [ ] Somehow important
5= [ ] Not important

Please give examples

……
……
……
……

7.5 Impact of the use of telephone on the vulnerability context

7.5.1 How important is the telephone in emergence situations? Please give examples.

……
……
……

7. 6 Barriers to the use of the telephone

7.6.1 If you are using a mobile phone how easy it is to get recharge voucher/air time?

……
……
……

7.6.2 How easy is it to charge your phone when the battery is down?
……
……
……

7.6.3 Do you face any problems with regard of the use of mobile phones?
1= [ ] Yes
2= [ ] No

7.6.4 If the answer to 7.6.3 is yes please explain those problems
……
……
……
…….....

7.6.5 Do you face any problems with the use of the English language menus provided in most mobile phones?
1= [ ] Yes
2= [ ] No

7.6.6 If the answer to 7.6.5 is yes please explain those problems
……
……
……
…….....
……

SECTION 8: INFORMATION NEEDS AND ICTs (Critical Incident Technique)

8.1 In the past one month have you experienced any situation in which you were supposed to make a decision, find an answer to a question, solve a problem or try to understand something? (*Respondents will be asked to explain as many situations as they can remember and for each instance question 8.2 to 8.7 will be asked*)
.....
.....
.....
8.2 In the situation or instances you have just described what was
1= [ ] the most important questions you needed to answer
.....
……..
2= [ ] the most important things you wanted to learn or find out
.....

…….
3= [ ] the most important things you wanted to understand better or just think about?
.....
…….
…….
8.3 What was the context of that instance/situation work/business, family issues, school related etc. please explain ……
……
……
……
8.4 How often do you experience such situations/instances?
……
……
……
8.5 Did you attempt (*depending on the nature of the situations the respondent gave*)
1= [ ] to arrive at a decision
.....
…….
2= [ ] To answer the question
.....
……..
3= [ ] To solve the problem or understand what you needed to understand?
……
…….....
8.6 How or where or from or who did you get the answer or help? (Describe the source)
……
……
8.7 How satisfied were you with the answer?
……
……

Thank you for your time

Appendix 4.2: Focus group discussion guide

Name of the community / telecentre ……
Date of the discussion……
Number of participants……..

1. In your opinion, what were the biggest community-related problems you faced before the telecentre project was established?
2. In your personal opinion, has these problems been solved since the telecentre was established?
3. In your opinion what were the biggest community-related problems you faced before this community had access to mobile phones?
4. In your personal opinion, has this problem been solved during the time of mobile phones presence?
5. In your opinion, can computers/mobile phones be used to solve problems that this community have?
6. Would you have preferred that the money spent by the government on telecentre was spent on another project instead?
7. If yes, what would you have preferred?
8. How do you get your information on seeds/fertilizers/fishing (waves)?
9. How do you sell your crop/fish?
10. What are the major problems that this community is faces in accessing/using mobile phones or computers/Internet?
11. What is the role of social networks in the day to day lives of people in this community?
12. How important are the mobile phones in strengthening social networks in this community?
13. How important is the telecentre in strengthening social networks in this community?

Thank you for your time

Appendix 4.3: Observation guide

Name of the community / telecentre…….
Date of observation …….

	Items to be observed	Details
1.	Access to electricity	
2.	Level of telephone service coverage in the community i.e. Mobile phone and fixed line telephone.	
3.	Other ICT services available in the community such as other telecentres or Internet cafés	
4.	Condition of the roads	
5.	ICT infrastructure in the community such as Mobile phone towers, Telephone lines, community telephone booth, Satellite dishes etc.	
6.	Type of Internet connection available in the telecentre	
7.	Speed of Internet connection	
8.	Check if there is any locally produced information products in the telecentre	
9.	Check the type of websites commonly visited by looking at search histories	
10.	Check business days/hours of the telecentre	
11.	Other sources of information e.g. CD-ROMs, local databases etc.	

12.	Observe actual use of the telecentre • Number of people using the telecentre per day, • Gender aspect of use	

Appendix 4.4: Interview protocol for managers of telecentres

Name of the telecentre……
Location ……..
Name of the manager (optional)……..
Date of the interview……

1. What is the approximate number of users in this telecentre currently?

...……
…….....
.....
.....

2. List the type of users served by this telecentre (for example students, business people, farmers, civil servants etc.)

...……
…….....

3. What services do you currently offer? (For example printing, scanning, training, Internet, telephone services, TV, radio services etc.)

...……
…….....
.....

4. If the telecentre has a community radio what programmes is the radio airing

...……..
…….....
.....
...……..
…….....
.....

5. What is the total number of computers available?

……
……

6. What is total number of printers available?

……
……

7. What other hardware is available?

...……..
……
.....
……

8. Are the facilities available in this telecentre enough to satisfy the needs of your users?

...……..
……
...……..
……

9. What is the most used service in this telecentre?

...……
……

10. What strategies are you using to ensure that users get access to information which is relevant to their needs? (e.g. Locally produced information) access

……
……
...……
……

11. What strategies are you using to ensure the telecentre continuous use and maintain the hardware and software over a long period of time without donor support or when donor grant run out?

...……..
……
...……
……

12. What kind of problems do the telecentre face in acquiring and maintaining ICTs?

……
……

13. What strategies are used in trying to overcome or solve problems mentioned in the above question?

...……..
……
...……
……

14. In your personal opinion and using the experiences you have since the beginning of this project: what has been the impact ICTs in development of the people leaving in this community in the following three areas

    a. Socially

...
.....
...
.....

b. In terms of knowledge acquisition

...
.....
...
.....

c. Financially / Economically

...
.....
...
.....

15. Can ICTs contribute to socio-economic development of the people in this community. Please give explanations for your answer.

...
.....
...
.....

16. Is there any direct relationship between the services offered by this telecentre and socio-economic development of the people living in this community?

.....
.....
...
.....
...
.....

Thank you for your time

Appendix 4.5: Interview protocol for officer responsible for telecentre projects at Tanzania Communication Regulatory Authority (TCRA)

Name of the respondent (optional)……..
Date of the interview……..

1. What policies/strategies does TCRA have to ensure wider accessibility of ICTs to the majority in Tanzania especially those living in rural areas?
2. What are your comments on the Tanzanian national ICT policy? Do you think it has been/will be successful in achieving what it was meant to achieve?
3. What role is TCRA playing in the implementation of the national ICT Policy?
4. What role is TCRA going to play in the implementation of the new universal access Act that was recently enacted by the parliament?
5. Why did it take so long for Tanzania to have a universal access policy/Act? It's almost 14 years now since the telecommunication sector reform started in Tanzania in 1993. What are your comments on this?
6. How does TCRA cooperate with other players like COSTECH and the ministry of infrastructure development in the implementation of ICT projects in rural areas of Tanzania?
7. What are you comments on the whole debate of ICTs for socio-economic development especially in the Tanzanian context?
8. What do you think are the major barriers for effective utilization of ICTs for socio-economic development in the Tanzania context?
9. One of the criticisms that have been raised about telecentres is that they provide access to the Internet but most of the information provided by the Internet is not relevant to the needs of the people in rural areas. How does your organization deal with the question of local content?
10. If regulator or government intervention is required to ensure universal access and hence utilization of ICTs for poverty reduction, what sort of intervention will that be?

11. What are the future plans that TCRA has regarding ICT sector development in the rural areas of Tanzania?
12. What are the major problems that TCRA is experiencing in fulfilling its mandate especially with regard to ensure universal accessibility of ICTs?

Thank you for your time

Appendix 4.6: Interview protocol for officer responsible for telecentre projects at Commission for Science and Technology (COSTECH)

Name of the respondent (optional)…….
Date of the interview……..

1. What are the major functions of COSTECH as far as the implementation of ICTs in rural areas of Tanzania is concerned?

2. What are the futures plans that COSTECH has regarding ICT sector development in rural areas of Tanzania?

3. What are your comments on the whole debate of ICTs for socio-economic development especially in Tanzanian context? Can ICTs reduce poverty in the Tanzanian context?

4. What are your comments on the Tanzania national ICT policy? Do you think it has been/will be successful in achieving what it was meant to achieve?

5. In your opinion what has been the contribution of COSTECH to poverty reduction strategies using ICTs in Tanzania?

6. What do you think are the major barriers for effective utilization of ICTs for poverty reduction especially in the Tanzania context?

7. What are the major problems that COSTECH is experiencing in fulfilling its mandate especially with regard to ICTs infrastructure development in rural areas of Tanzania?
8. How does COSTECH cooperate with other players in ICTS sector development in rural areas such as the ministry of infrastructure development and department of ICTs development at TCRA?
9. Despite various initiatives to localize programs e.g. Kilinux, Swahili Microsoft, there is very little use of such program on the ground. What do you think is the problem?

Thank you for your time

Appendix 4.7: Interview protocol for officer responsible for ICTs at the national ICT coordination office - Ministry of Infrastructure Development

---

Name of the respondent (optional)……
Date of the interview……

1. What policies/strategies does the ministry have to ensure wider accessibility of ICTs to the majority in Tanzania especially those living in rural areas?

2. What are your comments on the Tanzanian national ICT policy? Do you think it has been/will be successful in achieving what it was meant to achieve?

3. When is the implementation of this policy going to take place?

4. Tell me about the new universal access bill that was recently passed by the parliament.
5. Why did it take so long for Tanzania to have a universal access policy/Act? It's almost 14 years now since the telecommunication sector reform started in Tanzania in 1993. What are your comments on this?
6. Who will be the implementing agent for this Act? And how is it going to work
7. What types of ICTs will be covered in the universal access bill/Act. For instance Mobile phone, Internet, Community radios etc?

8. How does the ministry of infrastructure, TCRA and COSTECH work work/relate to each other when it comes to rural ICTs implementation?
9. What are the futures plans that the ministry has regarding ICT sector development in the rural areas of Tanzania?
10. What are you comments on the whole debate of ICTs for socio-economic development especially in the Tanzanian context?

11. What do you think are the major barriers for effective utilization of ICTs for poverty reduction in the Tanzania context?

12. What are the major problems that the ministry is experiencing in fulfilling its mandate especially with regard to ensure universal accessibility of ICTs?

Thank you for your time

Appendix 4.8: Research objectives, research questions and possible sources of data

Research Objective	Research Question	Possible Source of data
1. To study the current status of ICT sector development in the selected rural areas of Tanzania.	What is the current status of ICT sector development in the selected rural areas of Tanzania?	• Literature • Observation - Appendix 4.3 Item No. 1, 2, 3, 4,5 and 6 • Interviews with managers of telecentres - Appendix 4.4 Question No. 3,4,5, 6 and 7 • Interviews with officers from TCRA - Appendix 4.5 Question No. 3, 4 and 11 • Interviews with officers from COSTECH. – Appendix 4.6 Question No. 1 and 2
2. To investigate policies which are in place so as to facilitate development and utilization of ICTs in the selected rural areas of Tanzania.	What policies are in place so as to facilitate development and utilization of ICTs in the selected rural areas of Tanzania?	• Literature • Interviews with officers from TCRA - Appendix 4.5 Question No. 1, 2, 5, 6,7 and 10 • Interviews with officers from COSTECH - Appendix 4.6 Question No. 3,4,5 and 8
3. To examine the extent to which people in the selected rural areas of Tanzania have access to ICTs.	To what extent do people in the selected rural areas of Tanzania have access to ICTs?	• Literature • Observation - Appendix 4.3 Items No. 5, 6, 8, 9, 10 and 11 • Interviews with community members - Appendix 4.1 Question No. 4.1 – 4.3.2 (Section 4) Question No. 7.1.1 - 7.1.3

		• Interviews with managers of telecentres - Appendix 4.4 Question No. 1, 2, 8, 9, 10 and 11 • Interviews with officers from TCRA - Appendix 4.5 Question No. 9 • Interviews with officers from COSTECH - Appendix 4.6 Question No. 9
4. To examine use patterns of ICTs by people in the selected rural areas of Tanzania.	What are the use patterns of ICTs by people in the selected rural areas of Tanzania?	• Observation - Appendix 4.3 Item No. 9, 12 • Interviews with community members - Appendix 4.1 Question No 5.1 – 5.3.9 (Section 5) Question No 8.1 – 8.7 (Section 8) • Focus group discussions - Appendix 4.2 Question No. 8 and 9
5. To determine the impact of ICTs use on various aspects of the livelihoods of the people living in the selected rural areas of Tanzania.	What is the impact of ICTs use on various aspects of the livelihoods of the people living in the selected rural areas of Tanzania?	• Literature • Interviews with community members - Appendix 4.1 Question No. 6.1 – 6.6.1 Question No. 7.3.1 - 7.4.2 • Focus group discussions - Appendix 4.2 Question No. 1, 2, 3, 4, 5, 6, 7, 11, 12 and 13
6. To identify barriers to effective utilization of ICTs in the selected rural areas of Tanzania.	What are the barriers to effective utilization of ICTs in the selected rural areas of Tanzania?	• Literature • Interviews with community members - Appendix 4.1 Question No.6.7.1 – 6.7.6 Question No. 7.6.1 – 7.6.6

		• Interviews with managers of telecentres - Appendix 4.4 Question No. 12-13 • Focus group discussions - Appendix 4.4 Question No. 10 • Interviews with officers from TCRA - Appendix 4.5 Question No. 8 and 12 • Interviews with officers from COSTECH - Appendix 4.6 Question No. 6 and 7
7. To recommend a model for effective implementation of ICTs and their use for sustainable livelihoods in the selected rural areas of Tanzania	What is the appropriate model for effective implementation of ICTs and their use for sustainable livelihoods in the selected rural areas of Tanzania?	• Literature • Findings and conclusions emanating from all the collected data.

Appendix 4.9: Introductory letters from the office of the vice-chancellor, Sokoine University of Agriculture

Appendix 4.9.1: Introductory letter for Magu District

RPGS - 003

CHUO KIKUU CHA SOKOINE CHA KILIMO
OFISI YA MAKAMU WA MKUU WA CHUO
S.L.P. 3000, MOROGORO, TANZANIA

Simu:023-2604523/2603511-4; Fax:023-2604651; TELEX NO. 55308 UNIVMOG; MOROGORO

Kumb. Zetu : SUA/ADM/R.1/8 **Tarehe** 01 February 2007

Crop Marketing Bureau (CROMABU) Project Manager
Magu Telecentre
Magu

UTAFITI WA WAALIMU NA WANAFUNZI WA CHUO KIKUU

Madhumuni ya barua hii ni kumtambulisha kwako **Ms Wanyenda Leonard Chilimo**... mtafiti wa Chuo Kikuu cha Sokoine cha Kilimo. Huyo hivi sasa yuko katika shughuli za utafiti.

Kufuatana na waraka wa Serikali Kumb. Na. MPEC/R/10/1 wa tarehe 7 Julai 1980 na Kifungu Na. 8 cha Sheria Namba 6 ya 1984 (iliyokianzisha Chuo Kikuu), Makamu wa Mkuu wa Chuo alipewa madaraka ya kutoa vibali vya kufanya utafiti Nchini kwa Waalimu, Wanafunzi na Watafiti wake kwa niaba ya Serikali na Tume ya Sayansi na Teknolojia.

Hivyo basi tunaomba umpatie Mtaalamu aliyetajwa hapo juu msaada atakaohitaji ili kufanikisha uchunguzi wake. Gharama za malazi na chakula chake pamoja na usafiri wake atalipia mwenyewe kutokana na fedha alizopewa Chuo Kikuu. Msaada anaouhitaji zaidi ni kuruhusiwa kuonana na viongozi na wananchi ili aweze kuzungumza nao na kuwauliza maswali aliyo nayo.

Kiini cha Utafiti wa Mtaalamu aliyetajwa hapo juu ni:

Kuchunguza mchango wa Teknologia ya Habari na Mawasiliano katika maendeleo ya kiuchumi na kijamii ya watu waishio katika maeneo ya vijijini yenye miradi ya vituo vya wasiliano (telecentres).

Sehemu anazofanyia huo utafiti ni: ..... **Magu District** .....

Ikiwa kuna baadhi ya sehemu ambazo zinazuiliwa, ni wajibu wako kuzuia zisitembelewe.

Muda wa Utafiti huo ni kuanzia tarehe **15 February 2007** hadi **01 June 2007**.....

Ikiwa utahitaji maelezo zaidi tafadhali wasiliana nami.

Wasalaam,

Prof. G.C. Monela
MAKAMU WA MKUU WA CHUO

MAKAMU WA MKUU NA CHUO
CHUO KIKUU CHA SOKOINE CHA KILIMO
S. L. P. 3000
MOROGORO

Nakala: Mtafiti

Appendix 4.9.2: Introductory letter for Sengerema District

RPGS - 003

CHUO KIKUU CHA SOKOINE CHA KILIMO
OFISI YA MAKAMU WA MKUU WA CHUO
S.L.P. 3000, MOROGORO, TANZANIA

Simu:023-2604523/2603511-4; Fax:023-2604651; TELEX NO. 55308 UNIVMOG; MOROGORO

Kumb. Zetu : SUA/ADM/R.1/8 **Tarehe** 01 February 2007

Meneja
Sengerema Telecentre
Sengerema

UTAFITI WA WAALIMU NA WANAFUNZI WA CHUO KIKUU

Madhumuni ya barua hii ni kumtambulisha kwako **Ms Wanyenda Leonard Chilimo**... mtafiti wa Chuo Kikuu cha Sokoine cha Kilimo. Huyo hivi sasa yuko katika shughuli za utafiti.

Kufuatana na waraka wa Serikali Kumb. Na. MPEC/R/10/1 wa tarehe 7 Julai 1980 na Kifungu Na. 8 cha Sheria Namba 6 ya 1984 (iliyokianzisha Chuo Kikuu), Makamu wa Mkuu wa Chuo alipewa madaraka ya kutoa vibali vya kufanya utafiti Nchini kwa Waalimu, Wanafunzi na Watafiti wake kwa niaba ya Serikali na Tume ya Sayansi na Teknolojia.

Hivyo basi tunaomba umpatie Mtaalamu aliyetajwa hapo juu msaada atakaohitaji ili kufanikisha uchunguzi wake. Gharama za malazi na chakula chake pamoja na usafiri wake atalipia mwenyewe kutokana na fedha alizopewa Chuo Kikuu. Msaada anaouhitaji zaidi ni kuruhusiwa kuonana na viongozi na wananchi ili aweze kuzungumza nao na kuwauliza maswali aliyo nayo.

Kiini cha Utafiti wa Mtaalamu aliyetajwa hapo juu ni:

Kuchunguza mchango wa Teknologia ya Habari na Mawasiliano katika maendeleo ya kiuchumi na kijamii ya watu waishio katika maeneo ya vijijini yenye miradi ya vituo vya wasiliano (telecentres).

Sehemu anazofanyia huo utafiti ni: ..... **Sengerema District** .....

Ikiwa kuna baadhi ya sehemu ambazo zinazuiliwa, ni wajibu wako kuzuia zisitembelewe.

Muda wa Utafiti huo ni kuanzia tarehe **15 February 2007** hadi **01 June 2007**.....

Ikiwa utahitaji maelezo zaidi tafadhali wasiliana nami.

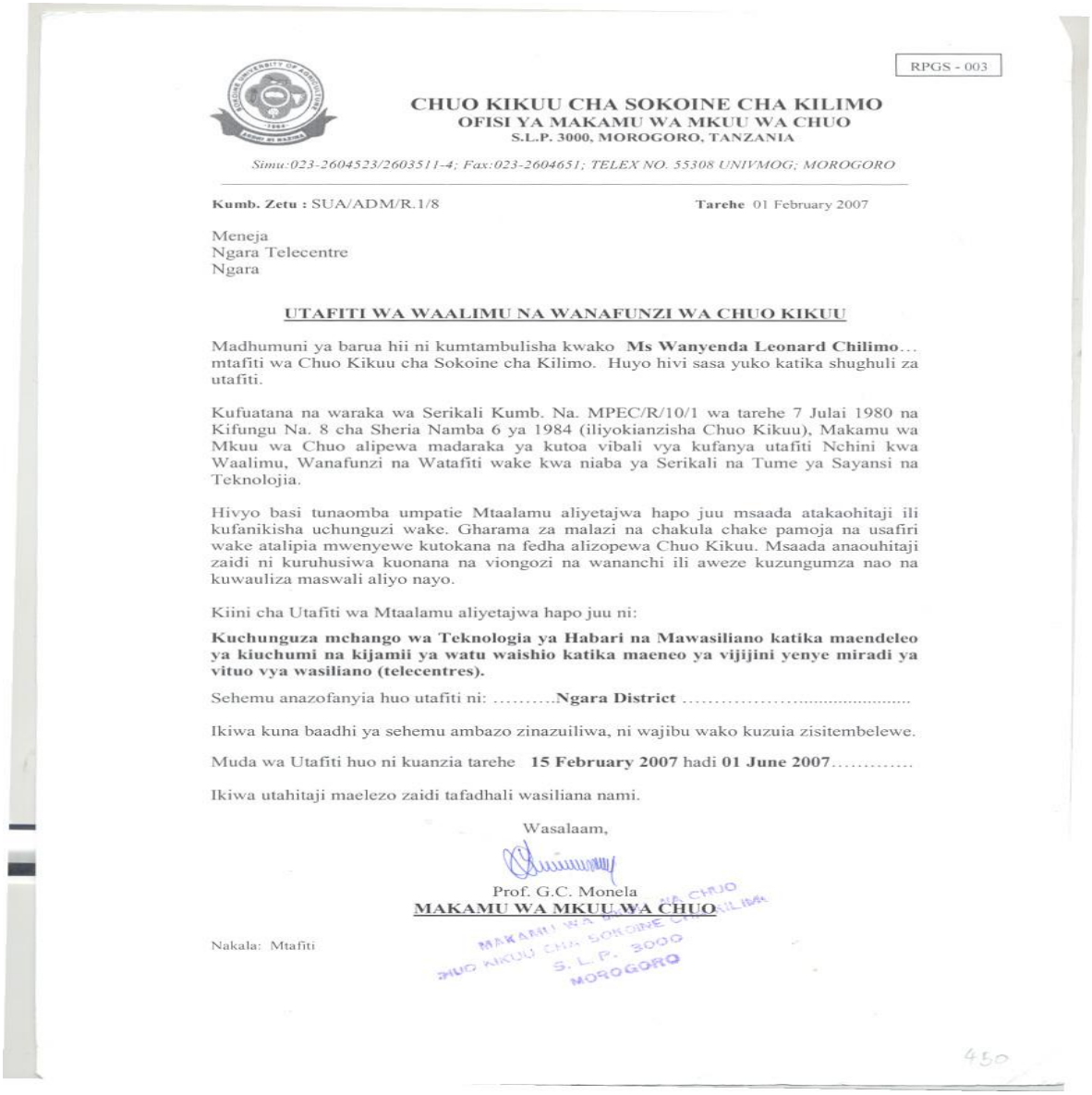
Wasalaam,

Prof. G.C. Monela
MAKAMU WA MKUU WA CHUO

MAKAMU WA MKUU WA CHUO
CHUO KIKUU CHA SOKOINE CHA KILIMO
S. L. P. 3000
MOROGORO

Nakala: Mtafiti

Appendix 4.9.3: Introductory letter for Ngara District



RPGS - 003

CHUO KIKUU CHA SOKOINE CHA KILIMO
OFISI YA MAKAMU WA MKUU WA CHUO
S.L.P. 3000, MOROGORO, TANZANIA

Simu:023-2604523/2603511-4; Fax:023-2604651; TELEX NO. 55308 UNIVMOG; MOROGORO

Kumb. Zetu : SUA/ADM/R.1/8 **Tarehe** 01 February 2007

Meneja
Ngara Telecentre
Ngara

UTAFITI WA WAALIMU NA WANAFUNZI WA CHUO KIKUU

Madhumuni ya barua hii ni kumtambulisha kwako **Ms Wanyenda Leonard Chilimo**... mtafiti wa Chuo Kikuu cha Sokoine cha Kilimo. Huyo hivi sasa yuko katika shughuli za utafiti.

Kufuatana na waraka wa Serikali Kumb. Na. MPEC/R/10/1 wa tarehe 7 Julai 1980 na Kifungu Na. 8 cha Sheria Namba 6 ya 1984 (iliyokianzisha Chuo Kikuu), Makamu wa Mkuu wa Chuo alipewa madaraka ya kutoa vibali vya kufanya utafiti Nchini kwa Waalimu, Wanafunzi na Watafiti wake kwa niaba ya Serikali na Tume ya Sayansi na Teknolojia.

Hivyo basi tunaomba umpatie Mtaalamu aliyetajwa hapo juu msaada atakaohitaji ili kufanikisha uchunguzi wake. Gharama za malazi na chakula chake pamoja na usafiri wake atalipia mwenyewe kutokana na fedha alizopewa Chuo Kikuu. Msaada anaouhitaji zaidi ni kuruhusiwa kuonana na viongozi na wananchi ili aweze kuzungumza nao na kuwauliza maswali aliyo nayo.

Kiini cha Utafiti wa Mtaalamu aliyetajwa hapo juu ni:

Kuchunguza mchango wa Teknologia ya Habari na Mawasiliano katika maendeleo ya kiuchumi na kijamii ya watu waishio katika maeneo ya vijijini yenye miradi ya vituo vya wasiliano (telecentres).

Sehemu anazofanyia huo utafiti ni: .....**Ngara District** .....

Ikiwa kuna baadhi ya sehemu ambazo zinazuiliwa, ni wajibu wako kuzuia zisitembelewe.

Muda wa Utafiti huo ni kuanzia tarehe **15 February 2007** hadi **01 June 2007**.....

Ikiwa utahitaji maelezo zaidi tafadhali wasiliana nami.

Wasalaam,

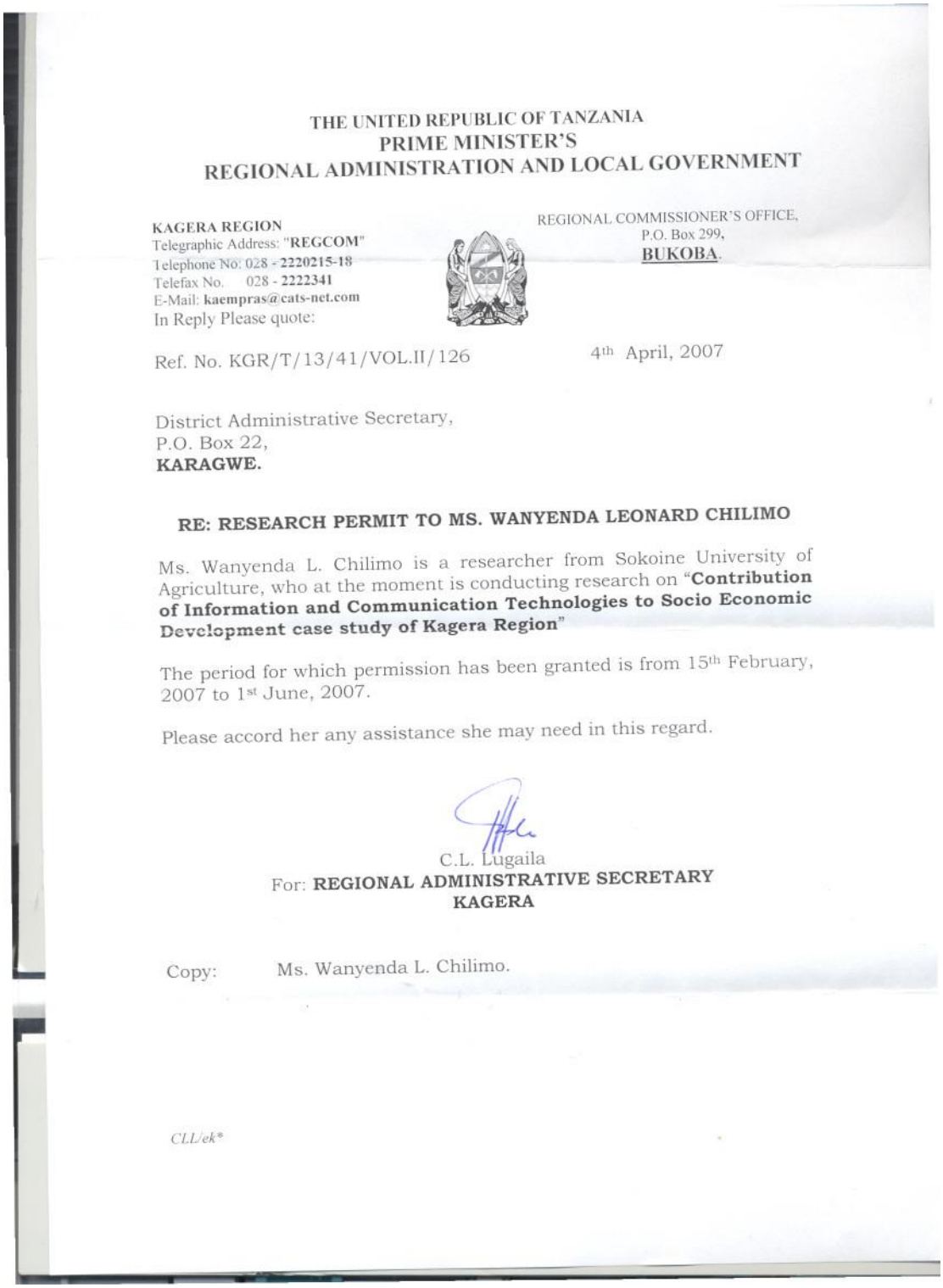
Prof. G.C. Monela
MAKAMU WA MKUU WA CHUO

MAKAMU WA MKUU WA CHUO
CHUO KIKUU CHA SOKOINE CHA KILIMO
S. L. P. 3000
MOROGORO

Nakala: Mtafiti

450

Appendix 4.9.4: Research permit: Kagera Region



THE UNITED REPUBLIC OF TANZANIA
PRIME MINISTER'S
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT

KAGERA REGION
Telegraphic Address: "REGCOM"
Telephone No: 028 - 2220215-18
Telefax No. 028 - 2222341
E-Mail: kaempras@cats-net.com
In Reply Please quote:

REGIONAL COMMISSIONER'S OFFICE,
P.O. Box 299,
BUKOBA.

Ref. No. KGR/T/13/41/VOL.II/126

4th April, 2007

District Administrative Secretary,
P.O. Box 22,
KARAGWE.

RE: RESEARCH PERMIT TO MS. WANYENDA LEONARD CHILIMO

Ms. Wanyenda L. Chilimo is a researcher from Sokoine University of Agriculture, who at the moment is conducting research on "**Contribution of Information and Communication Technologies to Socio Economic Development case study of Kagera Region**"

The period for which permission has been granted is from 15th February, 2007 to 1st June, 2007.

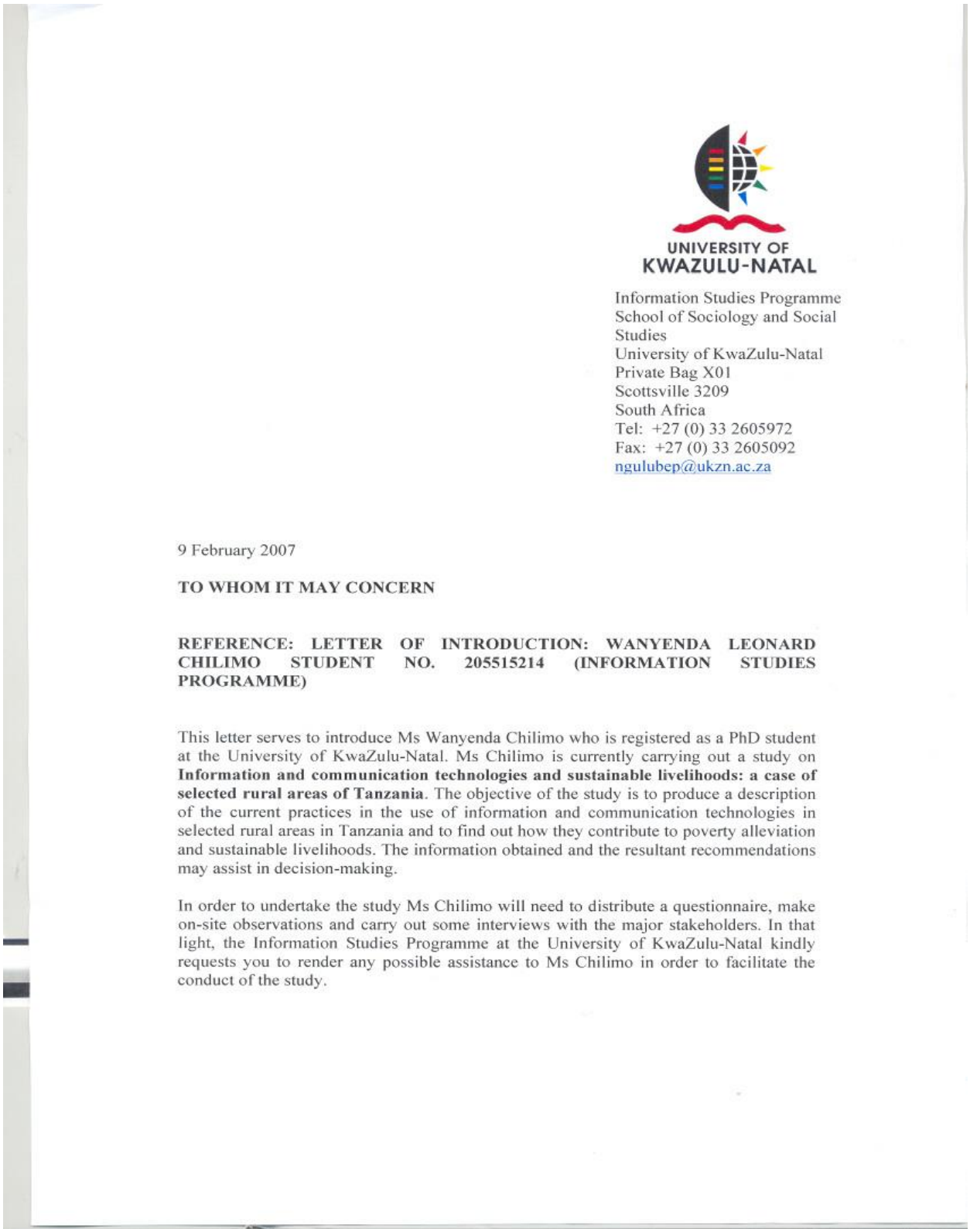
Please accord her any assistance she may need in this regard.

C.L. Lugaila
For: **REGIONAL ADMINISTRATIVE SECRETARY**
KAGERA

Copy: Ms. Wanyenda L. Chilimo.

*CLL/ek**

Appendix 4.10: Introductory letter from University of KwaZulu-Natal



UNIVERSITY OF
KWAZULU-NATAL

Information Studies Programme
School of Sociology and Social Studies
University of KwaZulu-Natal
Private Bag X01
Scottsville 3209
South Africa
Tel: +27 (0) 33 2605972
Fax: +27 (0) 33 2605092
ngulubep@ukzn.ac.za

9 February 2007

TO WHOM IT MAY CONCERN

REFERENCE: LETTER OF INTRODUCTION: WANYENDA LEONARD CHILIMO STUDENT NO. 205515214 (INFORMATION STUDIES PROGRAMME)

This letter serves to introduce Ms Wanyenda Chilimo who is registered as a PhD student at the University of KwaZulu-Natal. Ms Chilimo is currently carrying out a study on **Information and communication technologies and sustainable livelihoods: a case of selected rural areas of Tanzania**. The objective of the study is to produce a description of the current practices in the use of information and communication technologies in selected rural areas in Tanzania and to find out how they contribute to poverty alleviation and sustainable livelihoods. The information obtained and the resultant recommendations may assist in decision-making.

In order to undertake the study Ms Chilimo will need to distribute a questionnaire, make on-site observations and carry out some interviews with the major stakeholders. In that light, the Information Studies Programme at the University of KwaZulu-Natal kindly requests you to render any possible assistance to Ms Chilimo in order to facilitate the conduct of the study.

If you require any clarification pertaining to the study, please, feel free to contact Professor Patrick Ngulube, who is the supervisor of the research, on telephone 27332605972 or email ngulubep@ukzn.ac.za.

Thank you in advance in anticipation.

Yours faithfully

Prof Patrick Ngulube
Thesis Supervisor

Appendix 4.11 Informal Consent Forms

Appendix 4.11.1 Consent form for collecting data from users and non-users of telecentres

Consent form for collecting data on information and communication technologies and sustainable livelihoods: a case of selected rural areas of Tanzania

I am a student doing PhD in information studies at the University of KwaZulu-Natal. I am seeking your assistance with my study. You are being asked to participate in this study investigating how and for what purposes ICTs are used by people in the selected rural areas of Tanzania and study the impact that ICTs have on the various aspects of their livelihoods.

I am interested in determining the impact of ICTs on the livelihoods of people who are living in communities where telecentres are located. Very little is known about the relationship between ICTs and sustainable livelihoods in these communities, particularly in the Tanzanian context. Your participation in this study will help to clarify some of these relations so that we better identify way in which ICTs can be effectively used to achieve sustainable livelihoods.

Although you may not directly benefit from this research, results of this study will help rural communities in the future. This is because the results will informing the government, policy makers and institutions actively involved in promoting use of ICTs for socio-economic development on better ways of telecentre operations in the future and better ways of increasing rural ICTs accessibility and use.

If you will agree to participate you will be asked to take part in a structured interview which will last for about an hour. You may as well be asked to participate in focus group discussions.

Your participation is voluntary. If at any time during the study you wish to withdraw your participation, you are free to do so without prejudice. If you have any questions, prior to your participation or at any time during the study, please, do not hesitate to contact the researcher.

AUTHORIZATION: I have read the above and understand the nature of this study. I understand that by agreeing to participate in this study I have not waived any legal or human right and that I may contact the researcher (wchilimo@yahoo.com) or her supervisor Prof. Patrick Ngulube (ngulubep@ukzn.ac.za) at the University of Kwa Zulu Natal if I have any concern about my treatment during this study or if I need any clarification. I agree to participate in this study and I understand that I may refuse to participate or I may withdraw from the study at anytime without prejudice.

Participant's signature_____ Date_____

Researchers signature_____ Date_____

Appendix 4.11.2 Consent form for respondents participating in focus group discussions

Consent form for collecting data on information and communication technologies and sustainable livelihoods: a case of selected rural areas of Tanzania

I am a student doing PhD in information studies at the University of KwaZulu-Natal. I am seeking your assistance with my study. You are being asked to participate in this study investigating how and for what purposes ICTs are used by people in the selected rural areas of Tanzania and study the impact that ICTs have on the various aspects of their livelihoods.

I am interested in determining the impact of ICTs on the livelihoods of people who are living in communities where telecentres are located. Very little is known about the relationship between ICTs and sustainable livelihoods in these communities, particularly in the Tanzanian context. Your participation in this study will help to clarify some of these relations so that we better identify way in which ICTs can be effectively used to achieve sustainable livelihoods.

Although you may not directly benefit from this research, results of this study will help rural communities in the future. This is because the results will informing the government, policy makers and institutions actively involved in promoting use of ICTs for socio-economic development on better ways of telecentre operations in the future and better ways of increasing rural ICTs accessibility and use.

If you will agree to participate you will be asked to take part in a focus group discussion which will last for about two hours. Although the researcher cannot guarantee confidentially of the information you provide in these discussions because they will involve between 6 to12 other people from the community, however, the research will ensure that the information provided by one group is not passed on to other groups. Furthermore, your identity will remain anonymous when report the results of this study.

Your participation is voluntary. If at any time during the study you wish to withdraw your participation, you are free to do so without prejudice. If you have any questions, prior to your participation or at any time during the study, please, do not hesitate to contact the researcher.

AUTHORIZATION: I have read the above and understand the nature of this study. I understand that by agreeing to participate in this study I have not waived any legal or human right and that I may contact the researcher (wchilimo@yahoo.com) or her supervisor Prof. Patrick Ngulube (ngulubep@ukzn.ac.za) at the University of KwaZulu-Natal if I have any concern about my treatment during this study or if I need any clarification. I agree to participate in this study and I understand that I may refuse to participate or I may withdraw from the study at anytime without prejudice.

Participant's signature_____ Date_____
Researchers signature_____ Date_____

Appendix 4.11.3 Consent form for managers of telecentres

Consent form for collecting data on information and communication technologies and sustainable livelihoods: a case of selected rural areas of Tanzania

I am a student doing PhD in information studies at the University of KwaZulu-Natal. I am seeking your assistance with my study. You are being asked to participate in this study investigating how and for what purposes ICTs are used by people in the selected rural areas of Tanzania and study the impact that ICTs have on the various aspects of their livelihoods.

I am interested in determining the impact of ICTs on the livelihoods of people who are living in communities where telecentres are located. Very little is known about the relationship between ICTs and sustainable livelihoods in these communities, particularly in the Tanzanian context. Your participation in this study will help to clarify some of these relations so that we better identify way in which ICTs can be effectively used to achieve sustainable livelihoods.

Although you may not directly benefit from this research, results of this study will help rural communities in the future. This is because the results will informing the government, policy makers and institutions actively involved in promoting use of ICTs for socio-economic development on better ways of telecentre operations in the future and better ways of increasing rural ICTs accessibility and use.

If you will agree to participate you will be asked to take part in a semi-structured interview which will last for about an hour. You are also requested for a permission to let the research conduct the following activities: observe activities taking place in the telecentre and its premises, interview some of the users where necessary and check the type of websites commonly visited by users by looking at the search histories on the computers.

Your participation is voluntary. If at any time during the study you wish to withdraw your participation, you are free to do so without prejudice. If you have any questions prior to your participation or at any time during the study, please, do not hesitate to contact the researcher.

AUTHORIZATION: I have read the above and understand the nature of this study. I understand that by agreeing to participate in this study I have not waived any legal or human right and that I may contact the researcher (wchilimo@yahoo.com) or her supervisor Prof. Patrick Ngulube (ngulubep@ukzn.ac.za) at the University of KwaZulu-Natal if I have any concern about my treatment during this study or if I need any clarification. I agree to participate in this study and I understand that I may refuse to participate or I may withdraw from the study at anytime without prejudice.

Participant's signature_____ Date_____

Researchers signature_____ Date_____

Appendix 5.1: CROMABU price bulletin

CROP MARKETING LIMITED/TUWASILIANE
TAARIFA ZA BEI ZA MAZAO
WASTANI WA BEI ZA MAZAO KUANZIA TAREHE 6/2/2007

MAZAO	MASOKO													
	KATA NYIGOGO						KATA LUBUGU				KATA MWAMABANZA			MAGU MJINI
	YICHOBELA	NYASHIMBA	KINANGO	SAGANI	KIPEJA	ILUNGU	KISAMBA	NSOLA	LUBUGU	SAYAKA	MWAMABANZA	MWALINHA	SALONWWE	SOKOKUU
MAHINDI	AMBONI@1000/=	AMBONI@1,000/=	AMBONI@1,000/=	AMBONI@1,000/=	AMBONI@1,000/=	AMBONI@1,000/=	AMBONI@1,000/=	AMBONI@1000/=	AMBONI@1000/=	AMBONI@1000/=	AMBONI@1000/=	AMBONI@1000/=	AMBONI@1000/=	AMBONI@1000/=
UDAGA	AMBONI@1000/=	AMBONI@1000/=	AMBONI@1000/=	AMBONI@600/=	AMBONI@600/=	AMBONI@700/=	AMBONI@1000/=	AMBONI@1000/=	AMBONI@1000/=	AMBONI@1000/=	AMBONI@500/=	AMBONI@500/=	AMBONI@800/=	AMBONI@800/=
NYANYA	-	-	-	-	-	-	TENNGA@10,000/=	TENNGA@1,000/=	TENNGA@10,000/=	TENNGA@10,000/=	...	....	....	-
MAHARAGE	KG@800	KG@800	KG@800	KG@900/=	KG@900/=	-	KG@900/=	KG@800/=	KG@800/=	KG@800/=	KG@600/=	KG@600/=	...	KG@800/=
MCHELE	KG@750/=	....	...	-	-	-	KG@750/=	KG@750/=	KG@750/=	KG@750/=	KG@500/=	KG@500/=	...	KG@750/=
KARANGA	AMBONI@1300/=	AMBONI@1300/=	AMBONI@1300/=	AMBONI@1300/=	AMBONI@1300/=	AMBONI@1200/=	-	-	-	KG@1,000/=	AMBONI@600/=	AMBONI@6000/=	AMBONI@500/=	AMBONI@1200/=
DENGU	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VITUNGUU	-	-	-	-	-	-	-	-	-	-	-	-	-	KG@1200/=
CHOROKO	AMBONI@2,400/=	AMBONI@2,400/=	AMBONI@2,400/=	AMBONI@1,400/=	AMBONI@1,400/=	AMBONI@2,400/=	-	-	-	-	-	-	AMBONI@2,400/=	AMBONI@2400/=
KUNDE	AMBONI@900/=	AMBONI@500/=	AMBONI@900/=	-	-	-	-	-	-	-	-	-	-	-
MTAMA	AMBONI@700/=	AMBONI@700/=	AMBONI@700/=	AMBONI@700/=	AMBONI@700/=	-	-	-	-	-	-	-	-	-
PAMBA	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MPUNGA	AMBONI@1200/=	DEBE@2,800/=	AMBONI@2,800/=	AMBONI@1000/=	AMBONI@1000/=	AMBONI@1000/=	AMBONI@1000/=	-	-	-	AMBONI@1000/=	AMBONI@700/=	AMBONI@700/=	AMBONI@900/=

TAARIFA HIZI TUNAZIPATA KUTOKA KWA WAKULIMA NA WANUNUZI KATIKA MASOKO
YA MAGU,YICHOBELA,NYASHIMBA,KINANGO,NSOLA,MWAMABANZA,MWALINHA,SALONGWE,BUBINZA,LUBUGU,,SAYAKA NA SOKO KUU MAGU MJINI